

# THE IRON AGE

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## THE LONG-RANGE OUTLOOK IN INDUSTRIAL RELATIONS

By EDWARD S. COWDRICK

**E**VERY major business depression in the history of the United States has exerted profound and far-reaching effects upon the conditions of wage earners. In 1837, in 1857, in 1873, in 1893, in 1907 and in 1921, hard times weighed with extra severity upon those who had to sell their labor in glutted markets.

But with this generalization uniformity of conditions in different depressions ends. In detail the effects upon labor varied widely. In the panic of 1837, for example, unemployment wrecked an embryonic union movement and turned what was left of it away from collective bargaining and toward political agitation. It sent thousands of former wage earners across the mountains and down the Ohio in search of new homes and new careers. The depression of 1873 was followed by an accelerated growth of the Knights of Labor and by the appearance of numerous revolutionary philosophies and economic heresies.

The collapse of 1893, with its monetary complications, led to a temporary alliance between discontented farmers and unemployed wage earners. It

was characterized by Populism and the free silver crusade, with ultimate triumph for the gold standard, high tariffs and the "full dinner pail."

In the business decline of 1921 and in that through which the country is now passing, the situation has included a new factor—the modern theory and practice of personnel management. It is by observing the vicissitudes of personnel management in these two successive depressions and in the years between that we can best establish bench marks by which to project our survey at least a short distance into the future.

#### Personnel Work in 1921 and 1930

In 1921 there was much scrapping of industrial relations work and a high rate of vocational casualties among industrial relations workers. In 1930 and 1931 labor policies generally have been maintained and the turnover among personnel directors and their associates has probably been no greater than among other supervisory and staff employees.

The reasons for this contrast are not hard to find. The half-dozen years up to 1920 saw a rapid and often ill-considered development of personnel administration, sometimes under the direction of inexperienced and indifferently qualified men. Lack of cooperation between these specialists and the line executives was intensified by the theory then widely held that industrial relations should be the responsibility of a separate department, more or less independent of the operating organization. In 1921 personnel administration had not had time to rid itself of the imperfections incident to its youth. It was looked upon in many companies as a "frill"—a handy target for the efficiency man's axe when drastic economies became necessary.

Business revival in the years beginning with 1922 brought a new growth of industrial relations practice, with more experienced administrators and with a better understanding of its purposes and of its proper place in the industrial organization. Personnel management came to be looked upon as mainly a staff function, with direct responsibility for the carrying out of labor policies lodged with the line executives. This new philosophy facilitated cooperation and understanding between operating officials and directors of industrial relations.

#### Services of Labor Managers in Depression

It is not surprising, therefore, that, when depression once more blighted the nation's industry, managers leaned heavily upon industrial relations specialists for counsel and aid in meeting the difficult problems arising in the maintenance of labor. Moreover, the importance of personnel counsel was enhanced by the fact that in this depression more than ever in the past employers have exerted themselves so far as possible to preserve the jobs, the earning power and the economic status of the wage earners.

If a forecast may safely be based upon this experience, we may confidently predict that personnel administration has become a permanent part of industrial

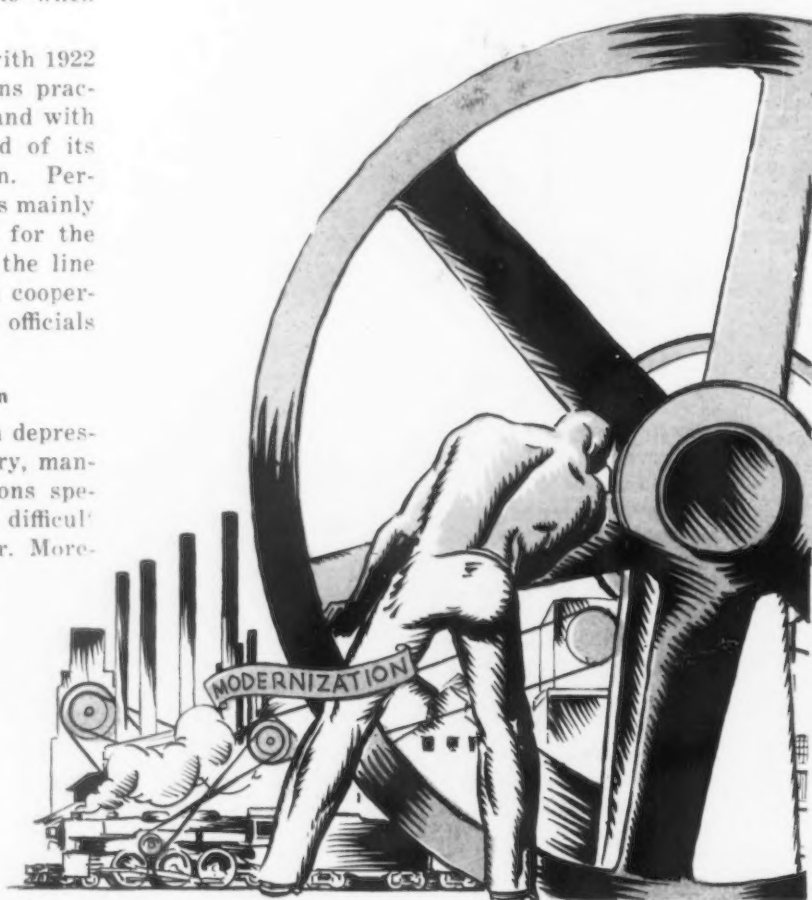
**I**n no other depression has industry done such an excellent job of distributing work and maintaining workers' income. Management, with a new conception of the economic importance of labor's earnings, has leaned heavily on its personnel departments in meeting the problems arising from curtailed operations.

There has been no such scrapping of industrial relations work as characterized the 1921 depression. On the contrary, person-

management and that the importance of its functions will increase rather than diminish in the next decade. Probably it will continue to be identified with the staff rather than with the line, and its more important duties will be advisory rather than executive. At the same time it is likely to become still further professionalized, with ever more exacting requirements of knowledge and experience in its practitioners. Increasingly it will be aided by science and research. It will also have the advantage of what appears likely to be a steadily growing interest in labor administration on the part of chief executives.

#### Problems of Coming Years

With personnel administration thus fortified in the industrial organization, what are some of the





nel administration has held its place in industry and promises to gain in importance in the coming decade.

With the revival of business activity there will be increasing emphasis on both cost reduction and expansion of consumer purchasing power.

Wage systems, the author says, will be scrutinized in search of methods by which earnings and output may be increased simultaneously.

♦ ♦ ♦

conditions which it will confront in the months and years immediately ahead? Just now the most troublesome labor problem is unemployment, and it seems probable that this problem will persist, at least for a time, after the passing of the current business depression. The story of industrial progress since about 1924 gives little reason to hope that a return to normal business activity will mean an immediate absorption of the entire labor reserve. It seems likely that for a time after business recovery has become complete there will be an appreciable amount of chronic unemployment, with the entire labor force of the country required only in times of abnormal activity, even if then. The degree of this industrial maladjustment and the probable period of its duration are questions that defy predic-



tion. Its ultimate cure depends upon events and forces that as yet are obscure.

Even a moderate extent of unemployment will at once raise questions as to the length of the working day and of the working week. Recent experience with short-time work has strengthened in many managerial minds the sentiment in favor of the five-day week, and even the six-hour day has gained support from sources which command respect. If working periods are permanently shortened, questions as to the use of leisure will at once press for solution. To this subject industrial management has given somewhat scant attention in the past. It will have to think more about it in the future.

Business depression of late has greatly increased the interest in employment guarantees and unemployment compensation. Several company and inter-company plans have attracted wide attention, and efforts of employers and employees to protect the economic security of wage earners have met with general approval. Whatever may be the extent of unemployment remaining after business recovery, it is likely that the interest in employment guarantees and unemployment compensation will continue and that important developments in this field are to be looked for in the nearby future. To this whole subject personnel directors and their principals are certain to devote much thought and effort in the next few years.

#### Increasing Labor Stability

Along with a greater or less degree of chronic unemployment there is likely to be a steady increase in labor stability. This seeming paradox really presents no inconsistency. On the contrary, unemployment and labor stability react upon each other, each serving as both cause and effect. When there is a labor surplus the worker who has a job takes care to hold on to it, and this very tenacity in job holding tends to perpetuate the surplus by lessening the number of vacant positions into which jobless workers may be absorbed. We may therefore expect to see—as we have seen for the last two or three years—a constant widening and deepening of the gap which separates the man with a job from the man without a job.

Some of the important consequences of this condition are social rather than industrial. On the side purely of labor relationships it is likely to lead to the following results:

1.—Managers will demand a constantly higher grade of employees. This will lead to increased attention to the selection, placement and training of wage earners and supervisors.

2.—The steadiness and efficiency of labor will increase, and, in consequence, other things remaining equal, the productive power and the earning ability of the individual worker will rise. This will bring about greater economic stability among the wage-earning population.

3.—Personnel administration will be concerned more and more with the so-called financial plans, including schemes for savings and investment and contributory pensions and insurance.

4.—The average age of working forces will rise. This will result in mounting costs of pensions, life insurance, and sickness benefits.

#### Other Labor Policies

Increased attention demanded by the conditions growing out of unemployment and stability of labor

will not necessarily detract from the importance of the other fundamental policies of industrial relations — rate setting, employment procedure, employee representation, union-management cooperation, and the rest. On the contrary, it is to be expected that all sides of personnel management will be developed and strengthened.

Whatever may be the trend of wage levels during the next few months—and in this connection it is well to remember that American employers have already done a better job of maintaining wages than was ever done before in a major depression—there is little doubt that the whole subject of compensation will bulk large in the personnel programs of the near future. Reviving business activity will not relax the pressure for efficiency and low costs, while at the same time the importance of consumer purchasing power will be further emphasized. Wage systems will be scrutinized in search of methods by which earnings and output may be increased simultaneously.

In former years, when in many companies the industrial relations man was looked upon as an "uplifter," wage setting and personnel administration were sometimes thought to have little relation to each other. Already there has been a decided change in the attitude of management toward this subject. In most of the larger companies the industrial relations directors, if not always actually in control of the rate-setting machinery, work in close cooperation with it and are consulted on all matters affecting earnings of the workers. Further progress in this direction is to be expected. Personnel managers who are not already familiar with the principles of wage determination and rate setting will do well to acquire that familiarity without delay.

#### Growth of Employee Representation

Among the labor policies which suffered severely in 1921 but which held their places in 1930, one of the most prominent is employee representation. Few, if any, representation plans have been reported as abandoned during the present depression, while some new ones have been established and some old ones have been enlarged. Employee representation—like its younger half-brother, union-management cooperation—has been found more rather than less valuable to both workers and management in a period of declining business and necessarily reduced labor forces. It has provided a means for mutual interchange of views and information and for consultation and joint action in determining personnel policies. Modern methods of cooperation probably are more firmly established in American industry than ever before and their importance is likely to increase in the next few years.

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**T**HE passing of the current business depression will not see the end of unemployment and its related problems, according to Mr. Cowdrick. Questions of shortened working periods, employment guarantees and unemployment compensation are in the offing, as well as important consequences arising from a marked increase in the stability of labor.

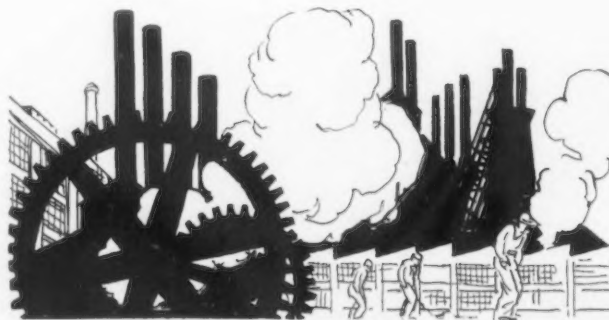
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Among the progressively exacting requirements of the man-power engineer, to which reference already has been made, is that of being able to see labor policies from the economic and financial as well as from the humanitarian viewpoint. If he is not himself an actuary or a statistician he is expected to be able at least to comprehend the findings of those specialists and to apply them to the

determination and administration of the industrial relations plans of his company. Much progress has already been made in this respect. In pension administration—to mention only one feature of a personnel program—many companies have made enormous advances beyond the old practice of paying annuities out of current earnings and trusting to some future good fortune to take care of accruing liabilities.

#### Industrial Relations Programs of Future

In all industrial relations work of the next few years we may expect to see a continuation of the recent tendency to see the personnel program as a whole. Labor management has advanced far beyond the stage at which a representation plan or a safety program or an elaborate system of "welfare work" was considered sufficient to solve the problem of employer-employee relationships. Already it is considered good practice, in contemplating the adoption of specific personnel policies, to view them as parts of a complete labor program in which each separate scheme should be adjusted to each of the others and to the whole. Further progress in this respect will go far in adding to the already impressive accomplishments of personnel administration in American industry.



# CUPOLA MELTING OF BRASS

By T. MAULAND

Metallurgist, International Harvester Co., Chicago

**T**HE practice of the International Harvester Co. of melting brass in a cupola, using fuel running 98 per cent or more in fixed carbon, is described in this article, which is based on a paper by the author at the annual convention of the American Foundrymen's Association. The cupola is small, lined down to 22½ in. inside diameter, and is operated on low-blast pressure and low air volume. The lining is a monolithic silicon-carbide cement with a backing of firebrick and an insulating brick. Alloys melted are 85-5-5-5 and 80-10-10 compositions. Principal loss of the first is in zinc and of the second, lead. Castings manufactured are largely carbureters and bushings. Some of these, being light, are poured at a temperature as high as 2300 deg. F.

**R**APID and economical melting, ease and ability to get hot metal, low melting loss, absence of heat and noise, and absence of fumes except when tapping are some of the advantages to be derived from cupola melting of brass. Ability to melt efficiently borings, turnings, spillings, skimmings, washings and insulated copper wire is another favorable consideration.

For two and a half years we have been melting bronze in a special cupola of small diameter, 35½ in., shell-lined down to 22½ in., operated on low-blast pressure and low air volume, using fixed carbon fuel. The metal and coke charges are weighed on a scale situated on the floor level near the cupola and are elevated and dumped into the cupola by a mechanical charging arrangement having a skip hoist and operated from the floor level.

The molten metal is tapped into a 180-lb. crucible hung on a trolley from an overhead monorail connecting with pouring cranes which serve all molding floors. In this way molten metal is taken from the cupola to molds direct without transfer. The operator occasionally ascends a platform located on the charging door level to observe the progress of melting or to poke down the charge, poking down being necessary only when long gates or other bulky materials are used in the charge.

The cupola air blast system is equipped with a volume meter and pressure gage. The slag hole is located on the side of the cupola and the charging apparatus in the rear. The section of the cupola from the bottom door to a foot or two above the melting zone is lined with a 2-in. monolithic silicon-carbide refractory backed by a course of firebrick and a course of Sil-o-cel brick for insulation. Ordinary firebrick is used above the melting zone.

For the monolithic lining, from 400 to 550 lb. of silicon-carbide cement is required. This lining is good for three weeks or more, depending on the tonnage melted and the care taken in daily patching. The life of the firebrick and insulating brick backing is approximately one year. Patching takes one hour of labor every morning, the bad spots in the lining requiring as a rule 20 to 40 lb. of silicon-carbide cement. After the tap hole and breast are fixed up, the bottom door is swung into place.

The bottom door is permanently lined with firebrick. The space between the wall of the cupola and the firebrick of the bottom door is partially filled with molding sand and then a mixture of fireclay and ground firebrick. This is done through an opening in the back of the cupola, which is then closed from the outside by two cupola blocks.

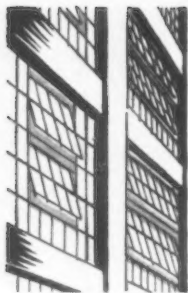
The bed charge of coke is ignited and brought to incandescence by natural draft through the open tuyeres. The blast is put on a few minutes before the first metal is charged. About 20 min. later the metal is ready to tap. The metal charges usually consist of alloy ingots, returned scrap and sprue and returned borings. They naturally vary with the class of castings made. When light castings are being produced on which there is considerable machining, the proportion of returned borings and sprue used is higher.

Two alloys are generally melted, either the 85-5-5-5 or the 80-10-10, or both. When changing from one alloy to the other, all the metal in the cupola is melted and drained out before the second alloy is charged. We try, of course, to run on one alloy as long as foundry conditions permit.

When melting the 85-5-5-5 alloy, the principal

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# GOOD LIGHTING IS A GOOD INVESTMENT

By HERBERT CHASE

Consulting engineer, Forest Hills, N. Y.

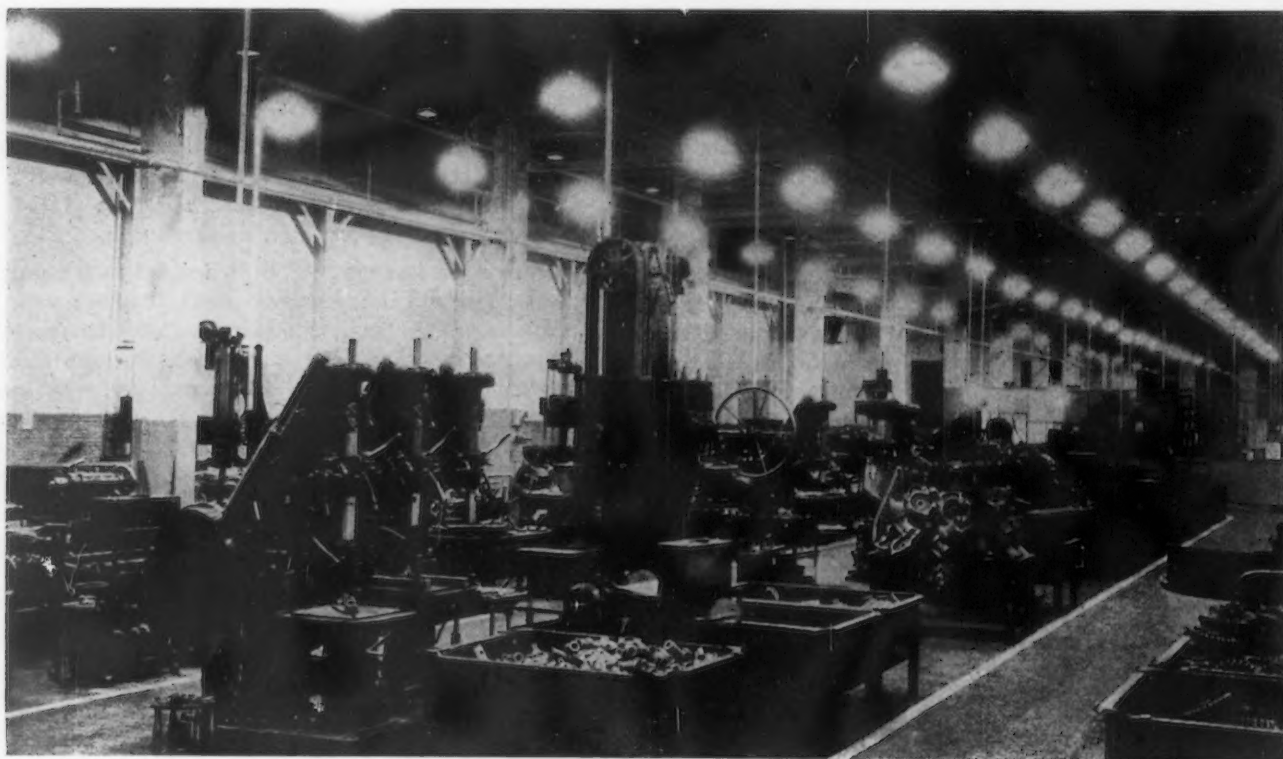
**N**OW that factories without windows or skylights are beginning to make their appearance, executives who stop to consider how undependable daylight is are coming to see more clearly than ever the advantages of a really good artificial lighting system. It is not to be expected, of course, that plants built to take advantage of natural light will shut it off entirely. But it is more evident than ever that the shop that tries to "get by" with inferior artificial light is imposing upon itself a serious handicap, for no workman can be expected to do his job most efficiently unless he can see perfectly.

Plants that are making the most money on a given capital investment today are those which are working this investment hardest by using the equipment which the investment has purchased the great-

est possible number of hours a day. This involves, of course, at least two and often three shifts a day, and no plant with such a schedule can possibly do without a first-class artificial lighting system. Since such a system is essential to maximum efficiency in any case, it is idle to place much reliance upon natural lighting.

Aside from its unreliability, one of the chief disadvantages of natural light is that its intensity varies constantly. During parts of most days it is likely to be so bright as to produce glare, and during other parts to provide insufficient illumination. In addition, parts of most shops never have adequate natural light. Moreover, daylight is not costless, as some assume.

It costs much money to keep windows and skylights clean, as well as to provide and adjust shades



300-watt incandescent lamps with R. L. M. reflectors, spaced on 10-ft. centers, give a lighting intensity of 20 foot-candles in this shop of the Arrow Head Steel Products Co., Minneapolis.

**U**NIFORM illumination without glare or deep shadows is an unquestioned aid in economical production work. Examples are given by the author to show how a properly designed system may result in enough saving to pay for the equipment in less than a year. He contends that, however good natural lighting may be, an adequate artificial system is nevertheless a necessity.

when these are required to prevent glare. Then, too, much heat escapes through glass windows and skylights in winter, and thus increases the cost of heating. If factories are built to take maximum advantage of natural light, they must either be single-story structures or must sacrifice much otherwise useful area to light-wells. In either case they cover more ground than necessary and this tends to increase overhead, especially where land values are high.

#### Speed and Accuracy Thrive on Good Lighting

Workmen often do not realize how much poor lighting slows their work or increases the number of errors they make, but carefully kept cost sheets are almost sure to tell the story. The saving realized through good lighting may appear to be small, but usually the shop in which the aggregate of small economies is considerable proves to be most efficient,

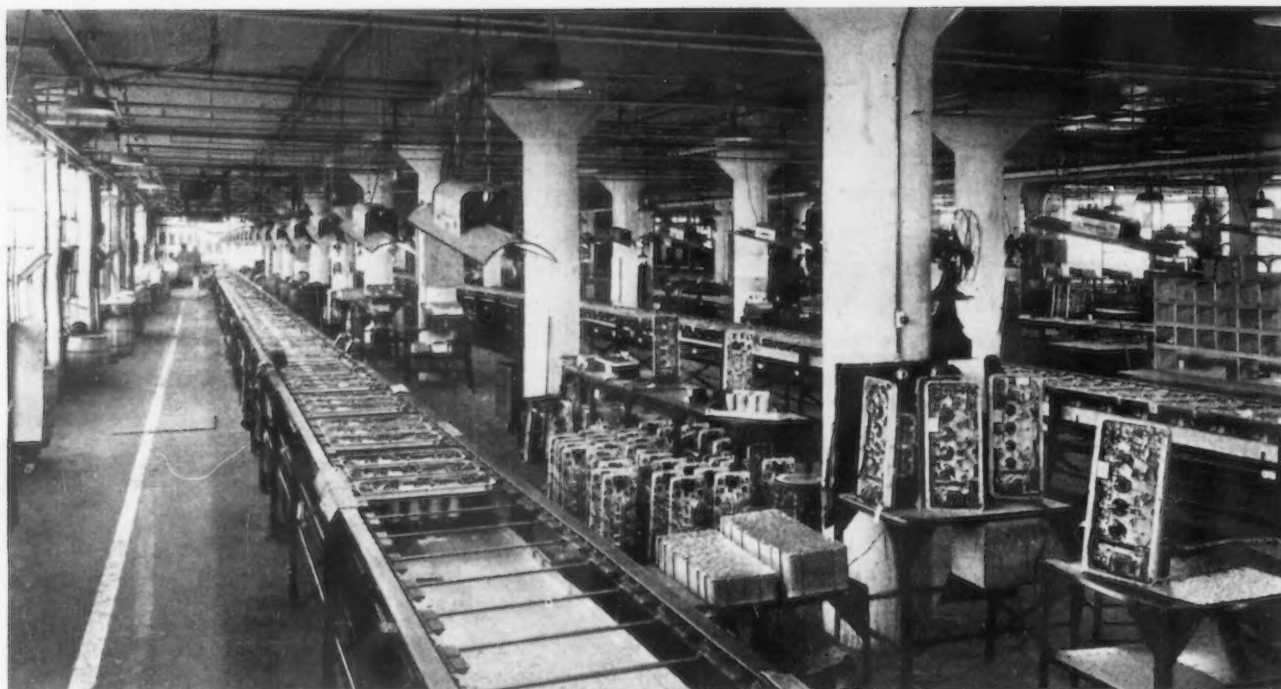
if other conditions in the plant are the same.

Partly for these reasons many of the most modern shops not only have the best of artificial lighting, but make use of it constantly, no matter how good the natural light may be. It is an established fact also that certain kinds of artificial light, especially that from the mercury vapor arc, make it possible to see better than in daylight. Defects and scratches on polished surfaces, for example, invisible in daylight, are readily seen in the approximately single-colored mercury vapor light. For this and other reasons such lights are used both for inspection and other work throughout many shops.

Shadows are important in their effect upon seeing conditions. This is another reason why natural light is unsatisfactory. It usually comes from one side only, thus leaving the far side of work in shadow. To avoid this effect, rows of lights often



Despite the large window area in this grinding department of the Lapointe Machine Tool Co., mercury vapor lights, some of them very close to the windows, are used to supplement daylight even on bright days.



Both mercury-vapor and incandescent lights help to give good illumination and to avoid shadows in the radio assembling department of the Philadelphia Storage Battery Co.

parallel the windows, back far enough to illuminate work that otherwise would be in shadow.

Good diffusion of light tends to soften or eliminate shadows; consequently it is important to see that artificial light is well diffused. Well-designed reflectors help diffusion and also help to shield the direct rays of light from the eyes. In effect they make the light source larger and this in itself promotes diffusion. Without proper reflectors the modern clear-glass incandescent lamp is neither efficient nor satisfactory in other respects, for its concentrated source produces excessive glare and the shadows it casts are hard and sharp. Proper reflectors minimize, if they do not completely eliminate, these disadvantages.

They are, however, of much less consequence in the mercury vapor light, for with it the source is large and of low intensity or low "specific brilliancy," as the lighting engineer puts it. Yet the total quantity of light can be made as great as with any other artificial source. Because of the large source, the shadows it casts are neither sharp nor dark, and the direct rays of the light are much less trying to the eye than are the direct rays from a concentrated source.

#### Powerful Illumination Should Not Be Concentrated

Glare is another factor having a most pronounced effect upon seeing ability. Any one who doubts this fact need only try to read when facing a strong light which shines directly into his eyes over the top of the page. He will find this a most trying and eye-tiring procedure. Yet in countless shops workers are required to do equally close work 8 hr. a day, week after week, under precisely this condition. It is small wonder that their efficiency is impaired.

Bright sunlight entering a window which the worker faces often produces this condition. It is present also whenever intensely bright artificial light comes within the line of vision, as it is sure to do when improperly shaded incandescent lights are employed. Most drop lights produce glare. Even when shaded from the eyes of the user, they are likely to shine into the eyes of other workers or to produce trying reflections from polished or oily surfaces.

No well designed lighting system makes use of unshaded incandescent lights. And even windows through which glaring sunlight enters should have some means for modifying or directing the light so that it does not enter the worker's eyes directly. It is true, however, that window shades require frequent adjustment and are likely to impair seeing conditions in bays not adjacent to the windows. But this is one more reason for not placing too great dependence upon natural light and for providing an adequate artificial lighting system.

First-class artificial lighting is really a very inexpensive tool. In many, if not in most, shops its total cost runs less than 5c. a day per worker, including 5 per cent annual depreciation, 6 per cent interest on investment and cost of current, cleaning, maintenance, and all other charges.

Consequently, even a very small saving, resulting from less lost time, reduction in waste, increase in output, or decrease in accidents, amply warrants the moderate investment required. In addition, the greater satisfaction and better health of workers and the accompanying decrease in lost time and in labor turnover, characteristic of well-lighted shops, should not be overlooked.

Generalizations based upon specific measured savings resulting from improved lighting are likely



to be misleading, but there is no doubt that many such savings are realized. The following examples, taken from data compiled by engineers of the A. C. Nielsen Co., may not be typical, but they are significant of what can be accomplished in some cases.

#### *Definite Savings Traced to Good Lighting*

**A** MANUFACTURER of automobile bodies replaced a lighting system which gave an average intensity of 6 foot-candles, with one of a similar type but 14 foot-candles, and a better distribution of light on the working surfaces. The total cost, including depreciation, interest, lamp renewals and power, amounted to \$2,380 a year, or about twice the former cost.

In one metal-working department the increased cost was \$428 a year, or 4.1c. a day per man. The labor turnover decreased from 6.37 per cent to 2.78 per cent a month, representing a saving of about \$100 a year in cost of hiring and training new men. In addition, the men were greatly pleased. Because their piece-work rate could be (and was) cut 8 per cent without reducing their total daily earnings, the lighting system saved the management \$842 a year, much more than enough to pay for the installation within this period.

In another department, on a putty-glaze conveyor line, the improved illumination made it possible to

reduce by 12 the number of men required, thereby effecting a saving of \$120 a day, or a net saving of \$117.65 a day when the extra cost of the lighting is deducted—enough to pay for the system every 10 days.

Considerable savings were effected also in the painting department, where the reduction in labor required for touching up work that formerly came through defective, because of the inability of workmen to see perfectly, cut net costs by \$1,680 a year, whereas the improvements required an investment of only \$600.

#### *Good Dividends Available in Most Shops*

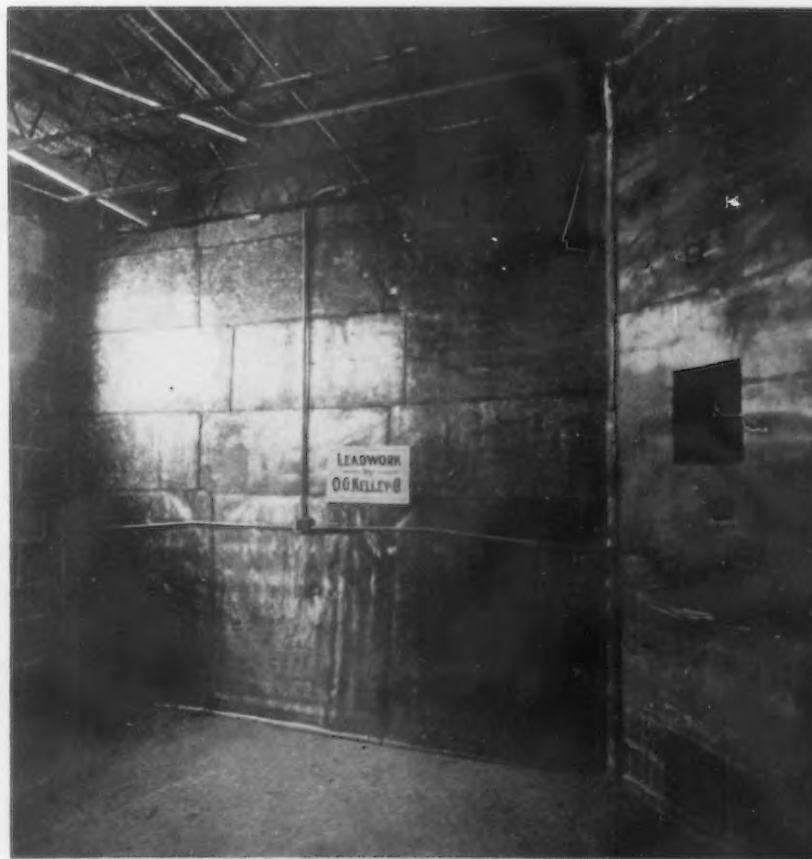
Not every shop can duplicate such savings, of course, but unless a shop has much better than average lighting conditions or is faced by some adverse situation unconnected with working conditions, an up-to-date lighting system is an investment destined to pay excellent dividends.

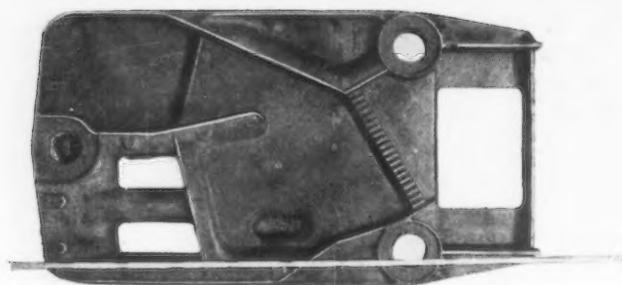
For the shop which runs more than one shift, and thereby boosts its output from a given plant investment in proportion, a first-class artificial lighting system becomes a prime essential. It is hardly less important, however, even in shops designed to make the most of natural light on a single-shift basis. For otherwise such shops cannot operate with full efficiency the year around, because of the intermittent and undependable nature of natural lighting.

### IMPRISONING THE X-RAY

**L** EAD provides prison walls to prevent escape of the beneficent and highly destructive X-ray. This X-ray room at Quincy Hospital, Quincy, Mass., being constructed by O. G. Kelley & Co., Everett, Mass., will accommodate a 175-kv. machine and, to prevent escape of the rays, will have a  $\frac{1}{8}$ -in. thickness of lead lining weighing 8 lb. to the square foot. A more powerful X-ray machine of 900 kv., being installed at the Memorial Hospital in New York, will require 2-in. sheets of 120 lb. to the square foot.

No space will be left uncoated with lead. Even the lag screw heads will be covered with small pieces 3 in. square. The opening for a window, through which observations may be made, will be filled with lead glass. All sheets on walls, ceiling and floor will overlap, and joints will be lapped and burned. The floor above will be protected by sheet lead on top and extending it about 6 in. beyond the walls, so there will be no direct route for rays to escape at the seam.





## GETTING MORE THE SAME

**T**WO methods have been put into effect in the gray iron foundry of the Lycoming Mfg. Co., Williamsport, Pa., to get a larger output without increasing the foundry area. One of these consists in grouping roller conveyors around Sand-slingers. The other consists in making two castings of identical design in a single flask only slightly larger than the one formerly employed for a single casting.

Sometimes with the same crew, sometimes with the addition of one man, making a crew of six instead of five, these changes have been put through. As a result, in one instance production in a 9-hr. day has been stepped up from 175 castings to 170 flasks, or 340 castings. Similar results are reported from the other units in which this system has been put into use.

This plant has two principal products—internal combustion engines for automobiles and motor boats, and boilers for heating purposes in residences, apartments, hotels, stores, etc. It is running at the rate of about 175 to 200 tons of iron poured each day, operating a single cupola, or sometimes two of the four cupolas installed. Two cupolas have 96-in. shells and two have 84-in. shells. They are lined respectively to 72 in. and 60 in.

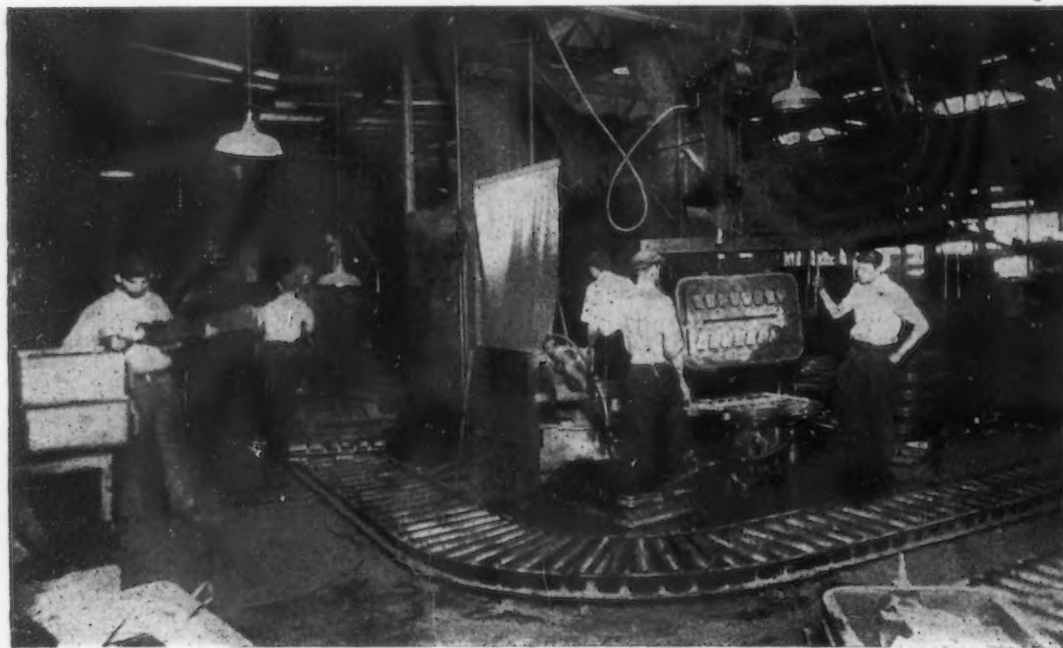
One element of considerable saving in both time and expense lies in the fact that the iron run from the

cupola is always from identically the same charge. Whatever changes in the iron composition are desired are made by additions in the ladle of such alloys as may be required for the purpose. The mix in the cupola charge as at present run is about 35 per cent pig iron (a mixture of several irons), 37½ per cent cast scrap from the foundry floor, and 27½ per cent steel scrap, of which four-fifths consists of broken steel rails.

It is reported that the cost of this iron at the spout is only about 0.9c. a pound, to which an addition for unloading charges and freight charges would make a total of perhaps 1.05c. This does not include overhead. This iron is taken from the cupola in one-ton bull ladles by an overhead crane. These ladles are set upon ladle stands conveniently located alongside pouring stations, and the pouring ladles are filled by tilting the bull ladle through hand gear. Except for the smallest sizes for small castings, the actual pouring is done from ladles carried on overhead tramrails and handled either by air hoists or by chain blocks.

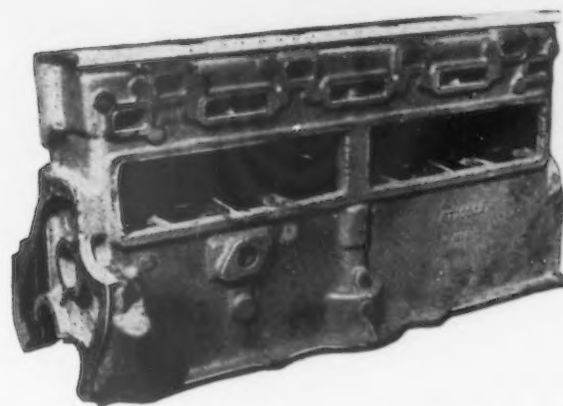
### *Castings Poured on Conveyors*

**T**HERE are four stations on which engine castings are poured while on conveyors. One is the carousel, motor-driven, on which cylinder blocks are poured.



ONE of the molding units, viewed from the rear. Cores approach it from the left. The drag made on one machine is placed on the conveyor, and the cope, made on another machine, is put upon it as it comes past that machine. Pouring and shake-out are on far right.

# CASTINGS FROM FLOOR SPACE



REARRANGEMENT of the floor space devoted to molding and installation of roller conveyors have made it possible for an automotive foundry to get almost twice as many castings from the same floor space. At the same time the crew has not been materially increased. How this has been done, in connection with other changes in practice facilitating greater speed in operation, is described here.

The other three consist of gravity rollers on which exhaust manifolds, cylinder head castings, and other work of the lighter nature are poured. It is planned to add three more of these gravity conveyor units, each with its molding machine, thus filling the length of the bay in which the similar units are now located.

All four of these stations are served by jolt ma-

chine, using properly tempered sand from overhead hoppers, and under overhead tramrails. The latter carry not only the pouring ladle, but also air hoists for handling and turning molds. Hence each station is a complete unit in itself, where all the operations of molding and pouring occur in proper, and rapid, sequence. The crew functions on a group piecework basis, making for tramwork and for as great productivity as can be had.

In an adjoining bay to the north, where the heater sections are cast, the larger sections are rammed up and poured on rollers, one casting to the flask. Here, again, some of the smaller units are poured two in a flask for the purpose of increasing production on the same floor space, and at the same time lowering the unit cost of the product.

Each bay has a long conveyor to take the castings, after being knocked out, to the cleaning section at the east end of the building. In the bay handling the motor parts this conveyor is power-driven, the castings being thrown upon flat tables running on a level with the foundry floor. In the heater bay the conveyor is

JOLT molding machines, used in producing the cope and drag, respectively. Samples of the product are shown at top of both pages.





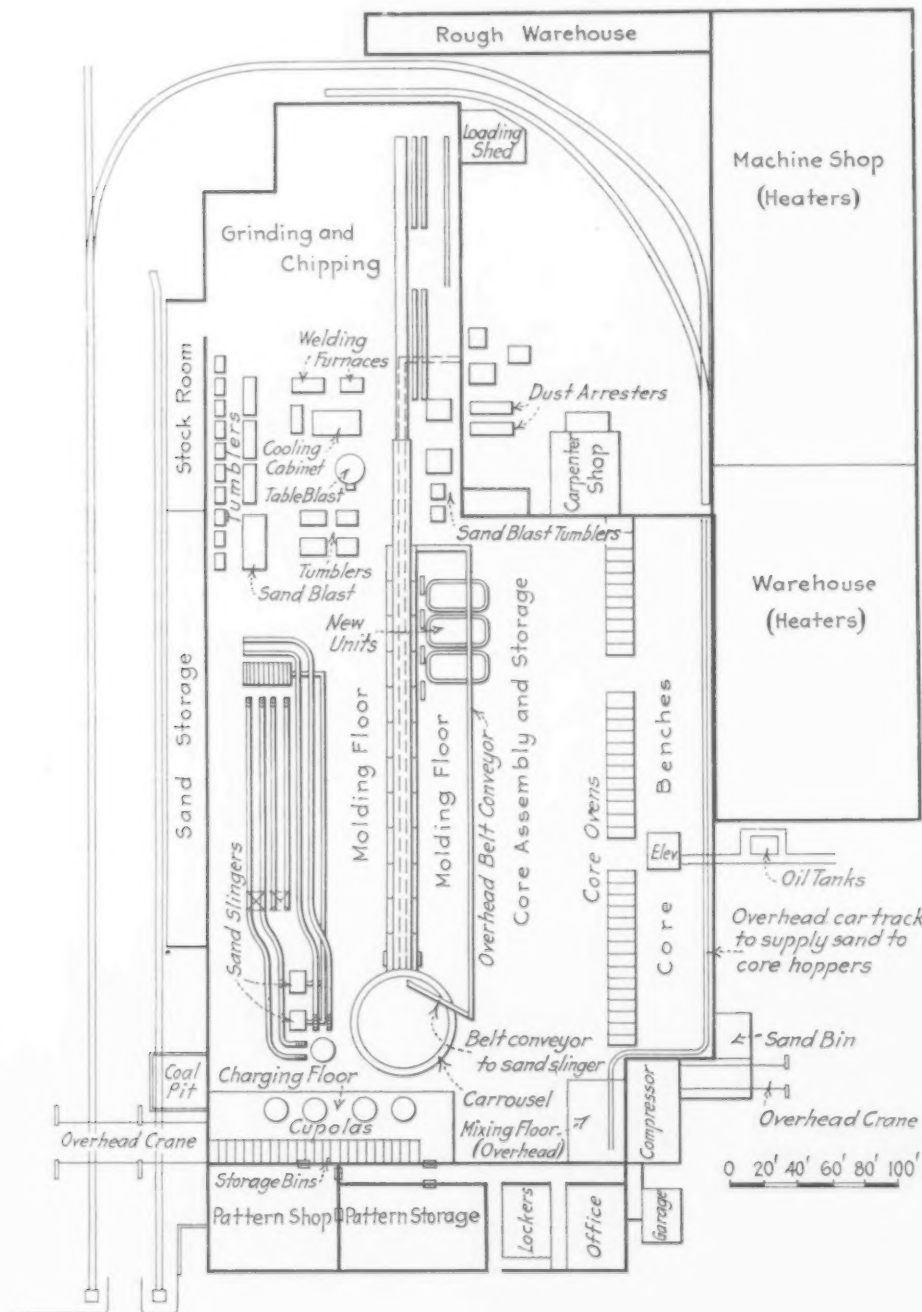
of the gravity roller type and the heavy castings are handled from there separately.

Castings are all run through tumbling barrels as the first cleaning process. Thence they go to grinders over several parallel lines of gravity roller conveyors. So far as possible the flow is in a straight line eastward. And castings of the same or similar character are carried on a single line of conveyor. Reaching

with boxed fittings for a unit assembly, to await shipping orders.

### Making Two Castings in One Flask

TWO methods for making castings for the engine cylinder block have been employed, one with the block integral with the crankcase, while in the other the block and crankcase are separate. In one such in-



GENERAL layout of the foundry (left), showing straight flow of materials from the cupolas at bottom of illustration to the grinding and chipping at top. Cores come from the right side, through the ovens, to the molding floors.

Detail of the molding units which have done so much to speed up production is shown on next page. All three units are alike. Pouring is near the upper end of the oval. After shaking out, the casting is thrown on the conveyor, which takes it to the cleaning department.

Casting heater sections on gravity conveyors is shown at bottom of next page. In the midst of the men at right is a bull ladle on its stand.



the end of the cleaning line, the engine castings go at once into the shipping dock for delivery, partly by rail and partly by motor truck, to the manufacturing plant, one mile away.

Heater castings go from the cleaning division into a heater storage division. Here they are machined—faced and tapped. After hydraulic test they are held,

stance, the integral casting weighs 270 lb. It is planned to make two of the cylinder blocks (separate from the crankcase) in a single flask, involving 165-lb. castings, or a total of 330 lb. in the flask. This, it is expected, will be done with the same six men now on the crew, and with production reaching approximately twice the present number of castings. Because

of the extra 60 lb. in each flask, the cost per pound will be somewhat lower.

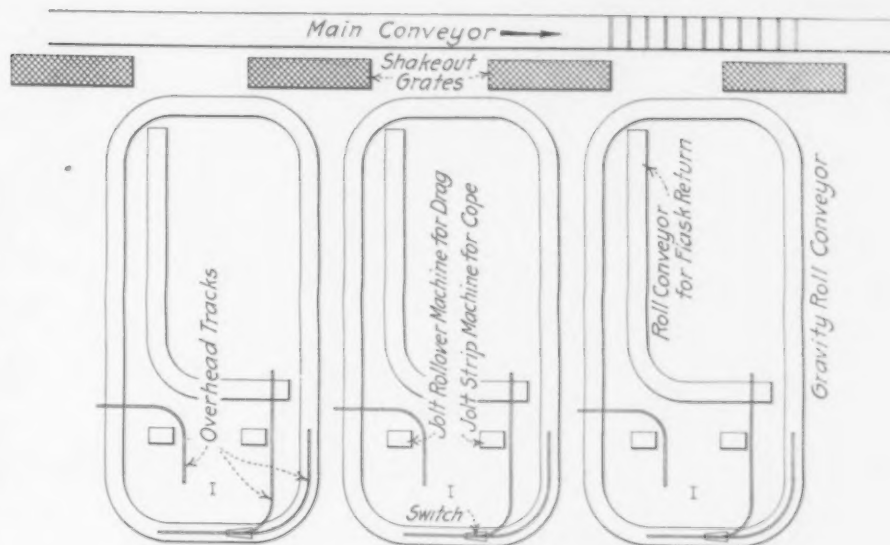
In the meantime two crank-cases will be cast in a single flask, and it is expected that the unit cost to the pound will be held down to the present cost of the integral casting. Integral castings for a V-type 12-cylinder engine, and for a V-type 16-cylinder engine, are being planned. It is expected that production will begin on these about the end of this year. These will weigh between 360 and 400 lb. each. The casting for one of the marine-type engines weighs approximately 600 lb.

#### Use of Ladle Additions in the Iron

MOST of the iron used is the straight run from the cupola, without ferroalloy addition. Some of the lighter sections having thin walls, etc., such as the manifolds for exhaust gases and other parts, have a certain definite amount of ferrosilicon added as the stream goes into the ladle. This adds to the fluidity of the iron and permits the thin sections to fill out easily. For the cylinder blocks there is an addition of ferrochrome or chrome-nickel, depending upon the specifications of the particular cylinder being cast.

It results naturally from the cupola mix and the ladle additions that these cylinders are made of very high-test iron. The Brinell hardness in the bore of the cylinder is at an average of about 207, against a specification of 196. Other parts of the block run up to about 217 and as high in some portions as 222.

To illustrate something of the gain in cupola production from the use of a single mix, it may be mentioned that formerly a 12-hr. cupola run gave about 120 tons, against 175 tons at present. The saving in time is found to apply not only to the cupola itself, but



to the pouring floors, where it is never necessary to wait more than a moment or two for iron.

An empty ladle going back to the cupola for its metal carries a red tag for iron which is to contain one ferroalloy, a black tag for another, etc. If there is no tag on the ladle that means the straight iron without ladle additions. These ladle additions are all carefully measured out in separate units in advance, so that all that is necessary is to put them in as the iron fills the ladle. As they are finely crushed and are poured into the stream from the spout, they become thoroughly mixed in the iron, without segregation.

Better control of the scrap coming back to the cupola is afforded by these methods. Most of the iron used contains such a small amount of ferroalloy, or none at all, that its effect in the cupola, in melting the iron for pouring, is practically negligible. Hence, it all goes into the cupola charge, without the necessity for segregating one kind of scrap from another, and then mixing stipulated percentages.

Cupola charging is by hand from wheelbarrows,





Cylinder-block molding units, showing in left background the Sand-slinger filling the molds, and, at right, a section of the carousel on which the molds are poured.

drawing from a conveniently located source of supply of material. An overhead crane spanning the charging floor, and running out into the open over two spur railroad tracks, deposits foreign scrap steel and the different grades of pig iron into the respective bins. From here the metal is picked up and weighed in wheelbarrows on its way to the cupola. A magnet is used for unloading cars.

These same craneways extend over the sand-mixing department, depositing sand by means of grab-buckets in overhead hoppers. From here it is dropped in batches into the mixing machines, and then is carried out on conveyors over the hoppers, whence it reaches the core makers and molders respectively.

A coke hopper overhead, parallel with the row of cupolas and between cupolas and metal bins, has spouts at intervals, from which coke can be drawn to go into the cupola charge.

#### *Cores Made on Two Floors*

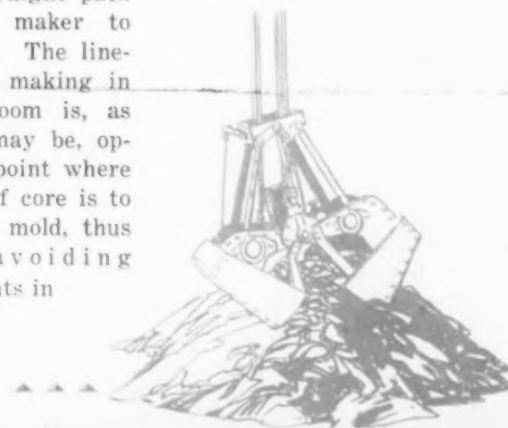
**T**HERE are two core rooms, one for the light work and the other for the heavy work. The light-work room is on the second floor and operated mostly by girls. Their products are run through eight tray-type ovens, and then delivered to the molding floor as needed, racks of cores being sent down the elevator. This room is exceptionally well supplied with daylight by means of large windows.

Underneath is the larger-core room. Cores here are made on machines for the most part, and then run

through core ovens on racks. The 36 ovens, all fired with oil, are placed between the core room and the pouring bay. Racks (on wheels) are run into the oven on the core-room side and, after the cores are properly baked, are run out on the foundry side. Each oven has capacity for two racks.

Much delay and confusion were done away with when these ovens were made of the "through" type. Formerly each had only one door—that from the core room. Racks accumulating for baking often had to be moved aside to make room so that racks of baked cores could be drawn out. Then these racks had to be pushed through congested aisles to reach a passage leading to the pouring bay.

All this is now avoided and the cores follow practically a straight path from core maker to core setter. The line-up of core making in the core room is, as nearly as may be, opposite the point where each type of core is to go into its mold, thus aiding in avoiding cross currents in their flow.





# FASTER AND MORE EFFICIENT GAS PRODUCERS

By VICTOR WINDETT

Manager, gas producer division, Wellman Engineering Co., Cleveland

SOME 20 years ago the gas producer art emerged from the era of the hand-worked producer into that of the mechanical machine. Characteristics of the earlier producers were low capacity, great fluctuations in gas quality, high carbon loss in the ashes, a high ratio of manual labor to heat output, and a demand for the best coal to be had.

Paralleling the developments of Bessemer, Siemens and Wellman in the manufacture of steel, William B. Hughes developed the first practicable and successful mechanical gas producer. This step was the essential foundation of the mass production of open-hearth steel.

## What Distinguishes the Mechanical Producer

Outstanding features of mechanical operation are mechanical rotation of the producer body and ash pan, use of a plow adaptable to continuous ash removal, a mechanical variable-delivery coal feed, and a mechanical poker. Resulting from this work were largely increased capacity and greater uniformity in the quality of gas. Additional benefits were decreased labor needed, less carbon loss in the ashes and lower gasification cost.

Some ten years ago this producer, having reached its state of highest development, gave way to a successor more suited to the trend of the times. Using past experience and untrammelled by time-worn tra-

DEVELOPMENT from the hand-operated producer of 30 years ago to the mechanical producer, and later to the present greatly improved mechanical operation, was outlined in a paper read May 22 at New York, before the American Iron and Steel Institute. Some of the characteristics of what may prove to be the future producer are brought out in the abstract of the paper here presented. In particular a plea is made to let the producer operator make the gas, instead of attempting to control the operation of his units from the furnace floor.

ditions, a restudy of the gas producer art was made. The ruling conditions governing the development of the new producer may be summed up in the one expression that low-grade coal must be gasified, and the dependability must surpass the high excellence of its predecessor and competitors.

These aims were achieved by the use of

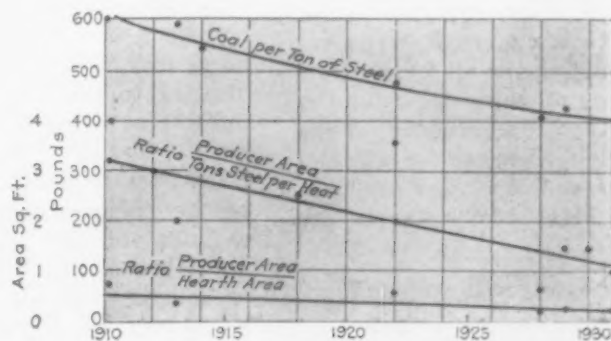
improvements, such as discarding the revolving drum feed for one using the alloy steel double bell and ring seat, with intermediate holding chamber, similar to the modern blast furnace top. Poker action was improved. Other new features used are the periodically intermittent ash pan differential motion relative to the body rotation, continuous ash plowing, and the substitution of a power-driven air blower with an independent humidification control instead of the less satisfactory steam jet blowers.

These improvements resulted in increased capacity at a decreased cost, as shown, with the approximate accuracy of average figures, in Table I.

Experience indicates that the limit of output,

without reaching its maximum, is fixed by the ability of the turbo-blower to deliver air to the gasification zone. The capacity of a blower must be such as to deliver air sufficient for maximum gasification, irrespective of the density of the ash zone and combustion zone above the air duct outlet.

The value of a producer gas has been



Trend of gas producer and open-hearth operation, showing steady improvement in efficiency for two decades.

taken customarily at its figure of the heat of combustion, based on chemical analysis. The figure thus secured is that of clean, washed gas at 60 deg. F. Such a gas is rarely used in industry. The gas as used is hot with its sensible heat and loaded with highly useful combustible tar vapors, soot and a certain amount of dust. Analysis shows that about 90 per cent of the tar vapors and about half of the soot and dust are carried into and burnt in the furnace. The net dust loss is only the weight of the carbon of the particles of coke of the original coal dust.

In making studies of fuels, the proper value of the heat content of producer gas is the sum of the heat of combustion of the gas, tar, soot and dust actually delivered into the furnace, together with their sensible heats.

A high gas velocity in the flues is advantageous in decreasing tar and soot losses, as a high velocity

creased, accordingly in recent practice. It is suggested that the thermochemical activity is intensified by this speeding up through heat generation in a shorter time interval, similar to that found in a blow-pipe flame.

It may follow, therefore, that heat losses by radiation and otherwise are somewhat lessened. In the case of these recent high rates the quality and the thermochemical efficiencies remain at the high values found in lower rates of working of the same type of gas producers, probably due to the speeding up.

#### What the Future May Hold

Tentative studies have been made as to what may be expected in the moderately near future as to gas producer output, reaching up to a gasification rate approaching 8 tons or more per producer hour, compared with the present high figures of somewhat over 3 tons. Special circumstances may warrant in certain cases so large a unit as one handling 8 tons an hour.

It is doubtful if such a jump from 3 to 8 tons will be made in one leap, for the reason that controlling the thermochemical and attendant functions of a producer are, at present, matters of empirical experimentation, rather than office and drafting room prediction and vision. In this a producer is more like a living organism than a statically determinant machine or structure.

Now it is thought that, for the moderately remote future, the present size of producer is about as large as average demand calls for. Until the open-hearth executives fall in line with the users of electricity, water and other energies of drawing their gas, water or electricity from a general main flue, equipped with suitable control valves or other instruments, no open-hearth furnace will be equipped with a single producer. Prudence would forbid and good judgment would overrule "paper" estimates of the savings suggested by a single producer.

Hence in the steel industry the largest producer desirable is such that in normal operation two units will serve one furnace, with a third for a standby. Or two alone may be sufficient, considering final costs per ton of steel made per year. Should one of the two be down temporarily, the other could carry on at a furnace output of, say, 75 per cent of normal.

#### Getting Desired Results

Proper coordination between gas man and furnace tender (whether he be an open-hearth melter or helper, or a heater in charge of a heating furnace) may be secured through the furnace man indicating to the gas house, by electric push-button lighting of either a blue or a red bulb, to call for more or less gas. At the same time the push button rings a bell to call the gas man's attention, should he not be looking at the lights. On receiving such a call, the producer man responds by correspondingly altering both rate of air and coal delivery into the producers. The lag or delay between the furnace man's call and the response is cut to a minimum.

In many plants it is customary to allow the melter to regulate the steam supply which actuates the

Table II—Changes in Gas-Producer Practice

	Practice Underlying Earlier Work, Still Used by Present Writers	Practice Obtainable Today
Gas producers.....	Stationary, hand worked	Mechanical and automatic
Coal feeding.....	By hand, periodic at variable times	Continuous, mechanical
Ash removal.....	By hand, periodic 12 to 24-hr. intervals	Continuous, mechanical
Air delivery.....	By steam jet, inseparable steam and air delivery	Turbo-blower, independently controlled humidification
Fire working.....	By hand, according to the inclination of the gas man, much carbon lost by hand poking	Continuous, mechanical poking of fire
Ash bed.....	Unworked	Periodic loosening to facilitate upflow of air supply
Producer zones.....	Oxidation, 0 to 5 in.; reduction 30 in.; distillation 1 ft.; total, 3 ft. 11 in. up to 7 ft.	Total 15 up to 30 in.
Gasification rates, lb. per sq. ft. per hour	8 lb. to 15 lb.	50 lb. to 108 lb.
Ratio CO/CO <sub>2</sub> .....	5 at 28 to 40-in. fire bed	5 at 15-in. fire bed
Gas velocity at off-take 1400 deg. gas	1.5 to 2.8 ft. a second	9.2 to 19.0 ft. a second
Gas flow through fire bed .....	1.4 to 4.6 sec.	0.5 sec.

decreases condensation and precipitation due to its greater carrying capacity. It also provides a shorter time for tar condensation consequent on a temperature drop.

A disadvantage of too high velocities is the undue consequent building up of gas pressure within the producer. This in turn for a given service increases the delivery pressure at the air blower outlet, resulting in an increase of power used for the blower operation. In the case of a turbo-blower the air delivery curve for such pressures of air and steam as are customarily found in routine producer operation is so flat that these circumstances are not serious.

#### High Efficiencies Recently Achieved

Speed of gasification and resulting functions have increased from six to ninefold (Table II), and the times of gas flow through the fire bed have de-

Table I—Advances in Gas-Producer Operation

Kind of Gas Producer	Year	Coal Gasification for Each		Cost	
		Producer Day, Tons	Sq. Ft. of Producer Area Hourly, Lb.	Operation and Overhead, Except Coal, per Ton	Total Cost per Million B.t.u.
Hand worked.....	1910	5 to 10	6.6 to 15.0	\$1.50	\$0.21
Early mechanical.....	1920	20 to 30	30.0 to 40.0	0.50	0.16
Modern mechanical...	1930	40 to 90	50.0 to 95.5	0.23	0.13

blower of the producer. This he does by manipulating a valve, placed for this purpose in the open-hearth building, with a long steam line from the charging floor to the gas producers. The engineer of a large steel works, who has designed in the past few months a large installation of open-hearth furnaces, is deliberately planning for remote producer control from the open-hearth charging floor.

Harmful consequences of such a design are of the following nature: It is reasonably certain that wet steam, carrying at times "slugs" of water, will be delivered into the producer air supply. Steam of this quality chills the fire, causes a low CO and high CO<sub>2</sub> and excessive moisture in the gas. The gasification rate falls. Addition of 1 per cent of moisture to the gas increases the fuel cost as much as though the CO<sub>2</sub> content had increased 2.25 per cent.

Another consequence is that remote control induces irregularity in the gasification conditions of the producer. The gas man has no way of discovering that the rate of air supply has been changed, except as he looks, from time to time, through an observation hole into the producer. Then he notes a considerable change in the fire level, or in the apparent gas temperature, or the appearance of more or less incipient holes in the fire.

His remedies are to alter, by guess, the rate of coal feeding (not knowing the actual rate of air supply), and possibly to do a certain amount of haphazard hand poking. He sees the fire conditions becoming poor, and the quality of the gas fall off. A gas man, newly employed, soon learns that he is thus hopelessly handicapped, acknowledges he is beaten by circumstances beyond his control, and contents himself with merely holding his job, accompanied with as little "ragging" as possible from all of his various bosses.

#### Discussion of Gas-Producer Paper

A PLEA for expert engineering supervision for the gas house was made by Martin J. Conway, fuel engineer, Lukens Steel Co., Coatesville, Pa. He

Table III—Gas Producer—Open-Hearth Practice

Plant	A	B	C	D	E	F	G
Year	1910	1913	1914	1922	1928	1929	1931
Producer type.....	Hand	Mechl.	Mechl.	Hand	Mechl.	Mechl.	Mechl.
Coal feed.....	Hand	Hand	Mechl.	Hand	Mechl.	Mechl.	Mechl.
Coal per ton of steel, lb.....	600	594	548	477	412	429	428
Producer area per ton of steel per heat.....	4	2	...	3.6	0.62	1.5	1.0
Producer area per sq. ft. hearth area....	0.72	0.33	...	0.6	0.2	0.3	0.2

thinks that it should have as adequate engineering care as a boiler plant, and correspondingly a full complement of recording instruments should be as much a part of its standard equipment as in the case of a steam plant. This argument is on the basis that a gas house frequently gasifies as much coal in a month as a large steam plant consumes. Cost is figured out as so much for each million B.t.u. delivered to the furnace.

This speaker suggests regulation of the producer plant through the temperature of the gas leaving the producer. Whenever the capacity is sufficient to permit, mechanical operation throughout should replace hand firing in producers. Wherever inferior fuel can be used, at a low unit fuel cost, the initial cost of a special producer to handle this fuel will soon be absorbed by the operating saving thereby achieved.

▲ ▲ ▲

### Reduction of Iron Ores by Methane

THE effects of varying temperature, time and gas velocity on direct reduction of magnetite and limonite ores to sponge iron by methane have been reported by O. Meyer and W. Eilander (*Stahl und Eisen*, March 5, 1931). The reduction of the uniformly sized ores by commercial methane was followed by analyses of the products and the effluent gases.

As the gas velocity was increased at constant temperature, the rate of reduction passed through a maximum, instead of approaching a limiting rate, as in reduction by hydrogen or carbon monoxide. With rising temperature at constant gas current the reduction rate increased uniformly, because sintering of the metallic iron was prevented by separating carbon. Limonite was reduced more readily than magnetite, beginning at about 1260 deg. F.

The reduction is not accomplished by methane directly, but by its decomposition products, hydrogen and carbon, which react with the ore, forming water and carbon dioxide. Metallic iron catalyzes the methane decomposition. Deposition of carbon is difficult to avoid and it increases as the reduction is prolonged.

If reduction is accomplished by the methane decomposition products without combustion, a sponge iron containing considerable carbon and phosphorus results. If carbon monoxide is developed by limited oxidation, a low-carbon sponge iron may be obtained. Both processes are possible. It is necessary to regenerate the reduction gases as far as possible.

Under the most favorable conditions the whole requirement of methane for reduction and for heating is about 10,500 cu. ft. per ton of iron.



The Iron Age, July 9, 1931—95



# EFFECT OF ADDING BISMUTH

**B**ISMUTH is one of the most interesting of metals with most unusual properties, yet very little is commonly known of its characteristics. It is highly resistant to acids, has a very low melting point and is strongly diamagnetic. It is mined by itself, and in this country is produced as a by-product of the production of gold, silver, lead and copper. Its quoted price today is \$1.25 a lb. but it is a fairly safe conjecture that this unusual metal could be produced at an even lower price, should consumption warrant larger production.

## Literature on Bismuth

Bismuth is used extensively in pharmaceutical preparations and in combination with lead, tin and cadmium in a series of alloys of extremely low melting point, some of which are molten at the temperature of boiling water. However, the literature shows but little on the effect of bismuth on ferrous metals. Marx stated (Schweigg, *Journal* 58, page 471) that he could not alloy bismuth and iron together. Henkel and Gellert announced that they made a brittle bismuth iron (Gmelin-Kraut, 1897, BD3 S 427). The most noteworthy research was that of Isaac and Tammann (Isaac and Tammann, *Zeitschrift Anorganische Chemie*, 55, 1907, page 58) who made various melts of bismuth in iron and drew the constitutional diagram, showing the complete immiscibility of the two metals in both solid and liquid condition.

Burgess and Aston made melts of bismuth in steel. (*Transactions Electrochemical Soc.* 15, 1909, page 369), the former in varying proportions up to 10 per cent. They reported unusual electrical properties in the steel, which, however, was not analyzed for bismuth and the probability is that little bismuth remained in the metal. G. Hägg reports X-ray studies

of iron and bismuth, (Royal Soc. Sci. Upsala, 7, 1929, page 1). A very complete digest on sources, properties and uses of bismuth is contained in circular of the Bureau of Standards No. 382 "Bismuth," by J. G. Thompson, research associate.

## Methods Used in This Research

Raw materials used by the authors for experimental work to study the effect of bismuth on cast iron consisted of various grades of cast iron and extremely pure bismuth, which analyzed over 99.9 per cent metallic bismuth.

(1) *Ladle Additions*: Preliminary experiments were conducted by addition of bismuth in amounts up to 2 per cent in 50-lb. ladles of cast iron. These tests were with a view of trying bismuth on cast iron under actual foundry

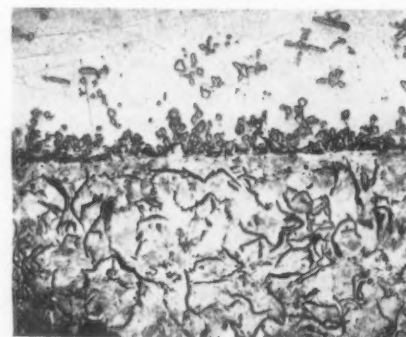


Fig. 2—Junction of bismuth and iron. Etched; 100 diameters. Upper part is iron.

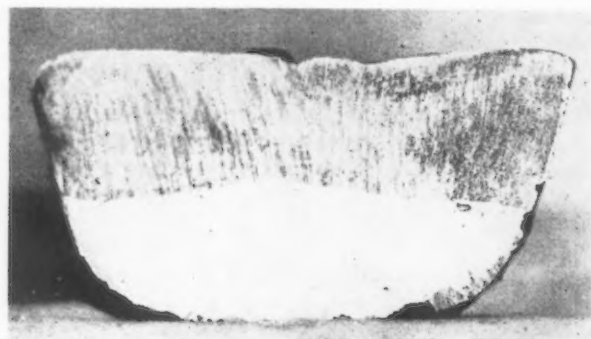


Fig. 1—Crucible melt of 50 per cent bismuth and 50 per cent iron. Upper portion is iron; lower, bismuth.

conditions. In each cast a standard tensile and transverse test bar was poured.

(2) *Crucible Melts*: In order to have more accurate control of iron composition, pouring temperature, etc., a series of melts was made in crucibles, similar amounts of bismuth being added. After suitable time for any possible reactions to take place, standard test bars were poured.

(3) *Electric Furnace Melts*: In order to study the effect of bismuth on highly superheated cast iron, several melts were made in a 250-lb. 'Lectromelt furnace.

In general, bismuth melted immediately and dropped to the bottom of the molten iron. Copious fumes were given off, presumably bismuth trioxide. A point noted by the molder handling the metal was that the bismuth-treated metal had much more "life" than the untreated. In fact, ladles of iron apparently on the verge of solidification, when treated with about  $\frac{1}{2}$  per cent bismuth seemed to be revived, the surface becoming clear and the iron being held in the ladle for a considerable period, before it became necessary to pour the test bars.

Another practical point was that the molding sand peeled very readily from the bismuth-treated iron, re-

# TO CAST IRON

By E. K. SMITH  
AND H. C. AUFDERHAAR  
Metallurgists, Birmingham

IN the absence of much information on the effects of additions of the metal bismuth to cast iron, the authors conducted a comprehensive research, the results of which they present in this article.

Bismuth was added to the ladle, and to crucible and electric furnace melts of iron. Additions to malleable iron and to steel were made also.

Bismuth acts primarily as a deoxidizer in cast iron. Bismuth-treated iron was found to have more life and fluidity than ordinary iron.

Four possible commercial uses are suggested. Though the metal is \$1.25 a lb., it could probably be produced at a lower cost, should consumption warrant.

regardless of the temperature at which the metal was poured. This was not the case with the untreated bars.

## Effect of Bismuth on Physical Properties

An attempt was made to determine the effect of increasing amounts of bismuth on the physical properties of the cast iron. In each series of experiments, it became apparent that the effect of bismuth was not cumulative. Up to about 0.3 per cent, bismuth had increasing effect, while from 0.3 up to 3 per cent the effect was of the like order regardless of the excess bismuth present. Therefore, all subsequent experi-

In general, the effect of bismuth on cast iron is as a softener; strength is lowered as is the Brinell hardness number.

The above Brinell figures were all taken at a point  $\frac{1}{8}$  in. below the surface of the arbitration bar. However, most of the bismuth-treated samples showed an outer edge of moderate hardness while the interior of the bar was decidedly softer, the differential being much greater than in the pearlitic cast iron.

## Machineability Test

It was noticed that the bismuth-treated bars could be drilled more easily than the untreated bars. Accordingly, a few machineability tests were run on treated and untreated bars of similar Brinell hardness. The machineability figure was arbitrarily taken as the penetration of a  $\frac{3}{8}$ -in. standard high-speed drill running at 400 r.p.m. under total load of 136 lb.; penetration was in millimeters.

Bismuth Added, Per Cent	Brinell Hardness	Penetration in Mm. per Min.
0	179	24
2	179	28
1	183	38
2	179	40

Machineability figures would tend to substantiate

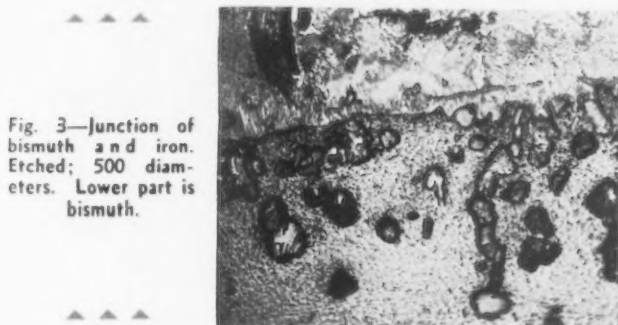


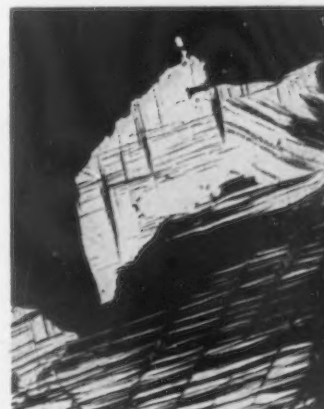
Fig. 3—Junction of bismuth and iron. Etched; 500 diameters. Lower part is bismuth.

ments were based on the addition of 1 per cent bismuth.

The table below gives a number of the characteristic samples. (Note: In a number of cases, the effect of bismuth was erratic, apparently due to lack of oxides in the iron.)

Bismuth Added Per Cent	Tensile Strength Lb. per Sq. In.	Transverse Strength Lb. per Sq. In.	Brinell Hardness
0	38,890	4200	241
0.5	26,500	3400	196
0.1	14,400	2200	187
0.2	12,695	1900	187
0.3	10,200	1600	170
1.0	10,250	1700	163

Fig. 4—Structure of bismuth. Etched; 100 diameters (reduced about one-half).



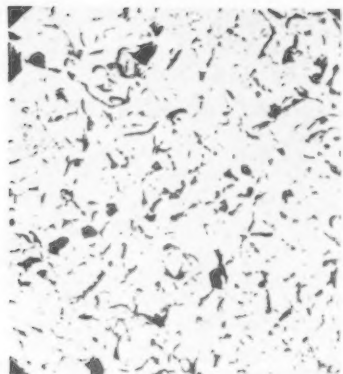


Fig. 5—Untreated cast iron, normal graphite. Unetched; 100 diameters (reduced about one-half).

practical observations, namely, that bismuth increased machineability more or less regardless of the Brinell hardness figure.

#### Chemical Analyses

Typical iron used in most of the experiments had the following analyses:

	Per Cent			
	a.	b.	c.	d.
Silicon .....	2.14	2.16	2.16	2.19
Manganese .....	0.36	0.34	0.34	0.33
Sulphur .....	0.100	0.093	0.096	0.103
Phosphorus .....	0.710	0.710	0.694	0.700
Total carbon .....	3.03	3.03	3.00	3.03
Combined carbon .....	0.49	0.23	0.14	0.20
Graphitic carbon .....	2.54	2.80	2.86	2.83
Bismuth added .....	0.0	0.20	0.30	1.00

The above series was made in order to determine the effect, if any, on chemical analysis of one type of cast iron. Bismuth reduced combined carbon and increased graphitic carbon, but had no further effect on chemical analysis.

In an attempt to account for the softening effect, analyses were run on the bismuth-treated iron for the element bismuth. In all, some 14 attempts were made to determine bismuth in the treated iron samples, results showing from 0 to 0.002 per cent on various samples.

As a check on samples of treated metal showing no bismuth by analysis, concentrated solutions of these metals were made and volatilized in an arc lamp. In all cases, the bismuth-treated metal showed the characteristic spectrum of bismuth while untreated samples showed no such lines.

#### Crucible Melts

In order to get more conclusive information as to the possible solubility of bismuth in molten or solid cast iron or even its solubility in any of the components of cast iron, a number of crucible melts were

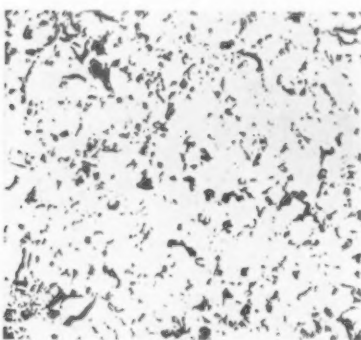


Fig. 6—Bismuth-treated cast iron. Small graphite. Unetched; 100 diameters (reduced about one-half).

made, using equal parts of bismuth and cast iron. The iron was first melted and then the bismuth stirred in. At intervals, the whole mixture was violently stirred, so as to insure complete mixing. After one-half hour, the melt was permitted to settle and solidify, cooling in crucible. The cold ingot was sawed vertically. Fig. 1 is a photograph of such an ingot, the bismuth being below, owing to its high gravity.

Drillings were taken from the iron half of ingot, and analysis run for bismuth, 0.63 per cent being found. A further investigation along similar lines was made, but with the melt held for some time to permit more complete settling of the bismuth. When thoroughly quiet, a small amount of the iron was poured into cold water, with the thought that more bismuth might be held by the iron in this condition. After solidification, drillings were taken from the iron and from the bismuth, analyses showing following results:

Sample	Bismuth Per Cent	Iron Per Cent
Iron shot .....	Trace	.....
Iron drillings .....	0.27	.....
Bismuth .....	.....	0.18

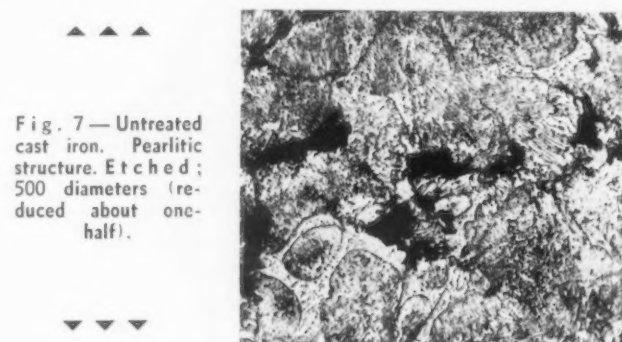


Fig. 7—Untreated cast iron. Pearlitic structure. Etched; 500 diameters (reduced about one-half).

Fig. 2 shows microstructure at the junction of bismuth and iron, at 100 diameters, and Fig. 3 is of same at 500 diameters. In the upper section, the structure is that of normal cast iron, while below the bismuth appears unchanged. However, in the intermediate zone there is strong evidence of some alloy, of unknown composition. Fig. 4 shows the microstructure of the bismuth section.

Although the microstructure of the cast iron shows no evidence of alloying except just at the junction between the two metals, analyses of the cast iron on two different 50-50 melts showed 0.27 per cent and 0.63 per cent bismuth. On the other hand, cast iron which had been treated with from 0.3 to 1 per cent bismuth, showed practically no bismuth by analysis.

This apparent discrepancy is probably due to small globules of bismuth which became separated from the lower part of the 50-50 melt and were carried by currents upward through the molten iron. In several cases, globules of bismuth were found on the surface of the iron; in other cases, fine particles, apparently of bismuth, were noted in the centers of the phosphide eutectic. It seems probable that the bismuth, shown by analysis in the cast iron of the 50-50 melts, is held mechanically.

#### Microstructure

While bismuth does not always affect cast iron uniformly, as a rule it has a softening effect on physi-





Fig. 8—Bismuth-treated cast iron. Ferritic-pearlitic structure. Etched; 500 diameters (reduced about one-half).

cal properties, and an effect rather unexpected to the authors on the form of the graphite. Fig. 5 shows the graphite in the untreated cast iron and Fig. 6 represents the treated metal. It was expected that the graphite in the soft bismuth-treated metal would be of the large flake variety, such as is sometimes found in annealed samples or where aluminum or titanium have been used as deoxidizers.

Bismuth in general gives very short flakes of graphite, associated with ferrite in the center of the casting and pearlite on the outer edge. The structure of "ferrite and small graphite," coupled with a sooty fracture and a great tendency to chill on the outer edge, is very characteristic of the bismuth cast iron fracture and seems to have a strong resemblance to a similar series of cast irons reported by Norbury in the *Journal of the British Iron and Steel Institute*, 1929, page 444 and following; also reported by the same author, *Journal of the British Iron and Steel Institute*, 1930, page 368 and following.

Figs. 7 and 8 are the untreated and bismuth-treated cast irons at higher magnification and etched to develop the structure. The untreated sample shows characteristic pearlitic structure, while the bismuth iron is composed of "small graphite and ferrite." It will be noted in Fig. 8 that the small grains of ferrite are either partly or entirely surrounded by a dark constituent which does not seem to be carbon. This particular intergranular substance was not present in the untreated samples even after an anneal had produced some ferrite.

As it seemed probable that the intercrystalline substance might have some relation to the extreme weakness of the metal coupled with its lack of shock resistance, a sample was carefully polished and then broken. Fig. 9 shows that the fracture is entirely intercrystalline. Some of the grains have been completely separated from the surrounding iron and

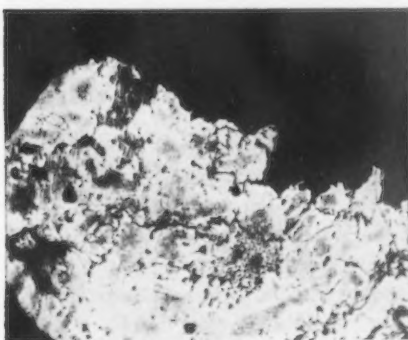


Fig. 9—Bismuth-treated cast iron. Inter-crystalline fracture. Etched; 500 diameters (reduced about one-half).

cracks invariably follow the grain borders. Fig. 10 shows a characteristic ferrite grain surrounded by a dark constituent (3500X).

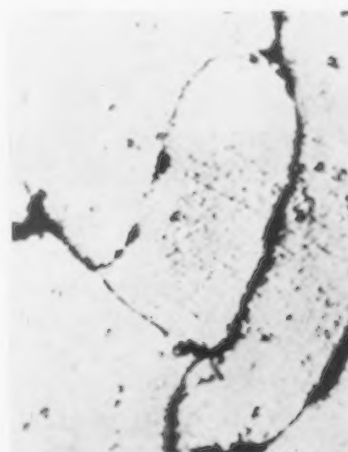
Fig. 11 shows the characteristic dark center of bismuth-treated cast iron. Bar at left is untreated iron; at right, bismuth-treated.

As the addition of bismuth to most cast irons resulted in a great softening effect, coupled with breaking up of carbides, it would seem reasonable that the effect is due to deoxidation of the cast iron. Bismuth trioxide, formed as a by-product, is stable, and it seems probable that a good part of this is left at the grain borders, forming planes of weakness. The bismuth trioxide has a gravity of 8.86; so it would seem reasonable that at least part of the bismuth trioxide would stay in suspension.

#### Theoretical Considerations

A number of theories were advanced to explain the unusual effect of bismuth in softening cast iron. It has been stated that the extraordinary weakening effect of bismuth on copper is due to a very small

Fig. 10—Bismuth-treated cast iron. Inter-crystalline inclusions. Etched; 3500 diameters (reduced about one-half).



amount of metallic bismuth which is forced to the grain borders on solidification, causing planes of brittleness. (Greaves and Wrighton, "Metallography," page 96.) Bismuth apparently has the same effect on gold.

At first sight a similar effect seemed probable with cast iron. As there is no alloying between bismuth and iron and no solution of bismuth in iron either in the solid or liquid state, it would seem highly probable that the change in physical properties is due to intercrystalline phenomena. The theory of intercrystalline films of bismuth metal had to be abandoned for several reasons. The very low proportion of bismuth found by analysis in the treated cast irons would deny the possibility of any continuous metallic bismuth films. Furthermore, a sample of cast iron thoroughly treated with bismuth was suspended in tension and maintained well above the melting point of bismuth. It seems probable that, were any appreciable intercrystalline films of metallic bismuth present, the metal would have softened.

The most probable theory to explain the effect of bismuth would seem to be that it acts primarily as a deoxidizer. This would explain the obvious fact that

the metal is greatly softened, due to the decomposition of pearlite and the formation of a "small graphite and ferrite" structure. The probable inclusion of some bismuth oxides as intercrystalline inclusions might account for low shock resistance.

In order to check the effect of bismuth on cast iron known to be oxidized, a number of crucible heats were made, in which materials certain to give oxidized metal were used. One heat contained 30 per cent cast iron borings with the remainder cast scrap. Bars from this mixture showed white fracture, while bars poured after 1 per cent of bismuth had been added showed heavily mottled fracture.

Another crucible melt was made with the addition of badly burned grate bars. In this case the first bar poured had a mottled fracture. A bar poured after the addition of 1 per cent bismuth showed a soft gray

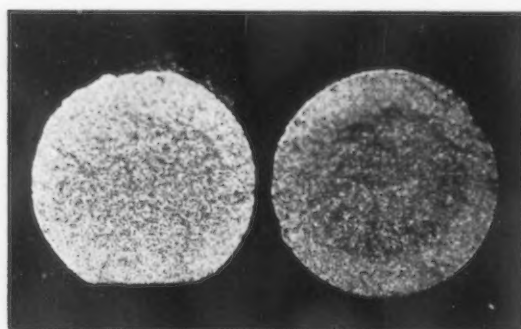


Fig. 11—Characteristic dark center of bismuth-treated cast iron (right). Untreated iron at left.

fracture in the center, surrounded by a 3/16-in. white edge.

#### Effect of Bismuth on Malleable Iron and Steel

In order to check the theory that bismuth acts as a deoxidizer, vary amounts were added to malleable iron and to steel. Results were inconclusive, owing to the fact that the bismuth boiled at a lower temperature (1436 deg. C. and 2615 deg. F.) than that of the molten malleable iron or steel. The addition of bismuth to cast iron is usually accompanied by the evolution of fumes, presumably bismuth trioxide, but in the case of malleable iron and steel, the entire addition of bismuth volatilized at once, having little apparent effect on the metal.

#### Possible Uses

The question of commercial uses for bismuth in cast iron is outside the scope of this paper. However, one or two possibilities might be mentioned:

(1) It might be used as a deoxidizer for metal known to contain excess oxides—such as mixtures in which thin or rusty scrap, borings and turnings or burned metal have been used.

(2) In the present era of high-test cast iron it might be desired to pour certain castings with very soft iron. This could apply where the iron required little strength or shock resistance but would be subjected to extensive drilling, etc.

(3) It has been suggested that iron with such low impact resistance might be subjected to fragmentation tests.

(4) It was noted that bismuth-treated iron had more "life" and presumably more fluidity. At the same time, test bars poured with such metal shook out practically clean from adherent sand. A possible field for investigation would therefore be the effect of bismuth iron for castings of very light section where fluidity and trueness to pattern and freedom from sand of the resulting casting might be an advantage.

#### Acknowledgments

The authors wish to acknowledge the kind cooperation of the American Smelting & Refining Co., New York, and the Cerro de Pasco Copper Corp., New York, both of whom furnished bismuth of 99.9 per cent, and over, purity for the experimental work, as well as check analyses on some of the metal. Fig. 2, 3 and 4 were reproduced from photomicrographs supplied by the Cerro de Pasco Copper Corp.

## Dust-Collecting System Piped Outside of Building

MANY reasons have contributed to the arrangement outside of a manufacturing building of a dust-collecting system, taking the dust from hazardous operations inside. This system is described in *Maintenance Engineering* by K. D. Hamilton of the George E. Keith Co., Brockton, Mass.

While this plant is engaged in the manufacture of shoes, the problems, so far as mechanical collection of dust is concerned, are similar to those in many industries. The building has four stories and basement, and measures 60 ft. x 400 ft., with an ell. It has a central dust-collecting settling tank on the roof. A low-speed exhaustor driven by a synchronous motor of 100 hp. discharges the dust into the large collector.

All the main piping is carried on the outside of the building, thereby leaving the interior of the building free from such obstructions. It was found easier to install the piping outside, as its path was free from the usual appurtenances inside the building.

Bringing all the piping and apparatus, with its attendant fire hazard, outside reduces the fire hazard of the property as a whole. To reduce this still further, cleanouts were provided at frequent intervals, particularly at elbows and joints, where experience has shown that inflammable materials collecting have frequently been ignited by sparks or spontaneous combustion.

All connections from the exterior piping to production machines were made through the windows. The suction applied to the various machines differs with the kind of material conveyed, each having been made the subject of separate study.

It has been found that the arrangement of piping on the exterior has improved the natural lighting inside the building, as the large pipes were carried on brackets along the curtain walls in a position where they would not interfere with the window lighting. All the joints are carefully soldered to prevent entrance of water, and the entire equipment was thoroughly painted to protect it against the elements.





Reino Gallenay

▲ ▲ ▲  
**S**TEEL at work and play. An unusual picture showing the Chrysler and Daily News buildings, New York, as seen through the structural members of a Ferris wheel used at a Second Avenue street fair.



# INFLUENCE OF COLD DRAWING

**O**FTEN it is desired to produce from a hot-finished tube a cold-drawn tube of some smaller cross-sectional area, or of closer diameter tolerance, or a better surface finish, than can be obtained hot finished. This is accomplished by drawing the tube through a die somewhat smaller than the diameter of the original tube.

Fig. 1 illustrates the relation of the tube in the die. A mandrel is not always used. If one is used, its size is such that the space between the die and the mandrel is less than the wall thickness of the tube to be drawn. When the tube is drawn through the die under these conditions, it is apparent, of course, that the wall thickness as well as the outside diameter of the tube is reduced.

Preliminary to cold drawing, the tube must be pointed on one end so that sufficient length of reduced diameter may be passed through and beyond the die to permit the pliers of the bench to secure sufficient grip to draw the remainder of the tube through the die and over the mandrel. Following the pointing, the tube is sent to the pickle tub, where all scale adhering to it is carefully removed by pickling. The tube is then rinsed in water to eliminate the acid, then dipped in a lubricant, the purpose of which is to reduce friction and prevent metal-to-

metal contact between the tube on one side and the die and mandrel on the other.

Actual drawing of the tube is done by means of the draw bench chains and the pliers, or grips, which can be hooked into the chain after they have grasped the point of the tube. The drawing is accomplished at a speed varying from 25 to 60 ft. a minute and the reduction in cross-sectional area for one cold-draw pass may vary up to 50 per cent. Successful cold drawing of a seamless tube section is rendered much more difficult than the drawing of a solid section, such as wire or shafting, owing to the fact that the internal surface of the tube presents material difficulty in the matter of proper cleaning, pickling and lubrication; and it adds friction surface.

## Hardness Acquired in Drawing Necessitates Annealing

After drawing a tube possesses considerable mechanical hardness, almost directly proportional to the reduction of area resulting from the cold-draw pass. As a desired size cold-drawn tube in the smaller diameters cannot be reduced in one pass from the original 1½ or 2-in. hot-rolled tube, a number of cold-draw passes may be required.

Owing to the mechanical hardness resulting from

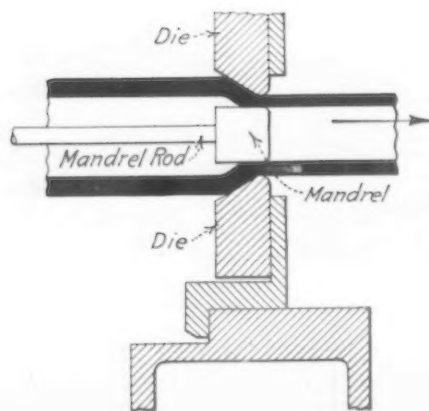


FIG. 1—Illustrating position of tube in die of cold-draw bench. Tube is pulled in direction shown by arrow.

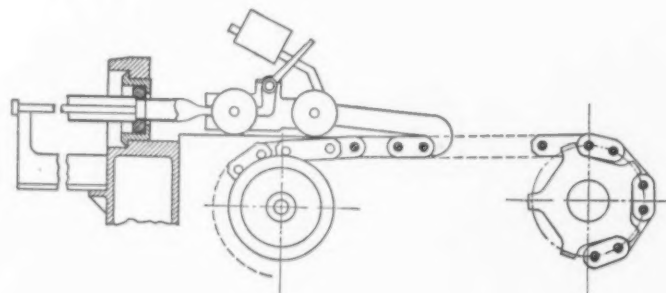


FIG. 2—Chain mechanism and clutch or grip which do the pulling of the tube through the die.

# ON PROPERTIES OF SEAMLESS TUBES

the preceding pass, it is necessary to anneal the tube after each pass before it can again be drawn successfully. In general, temperatures of 700 to 800 deg. C. are employed for such annealing. Two types of furnaces are used. The most common type, which is used on material relatively heavy in cross-section, is of the open-fire type, in which the work is exposed directly to the flame of the fire. The second is a specially designed electric furnace with accurate temperature control.

A further modification of such annealing is re-tort annealing, in which the tubes are placed in a cylindrical container and the ends sealed to prevent the ingress of air, thus minimizing surface oxidation. This method is especially applicable and desirable on thin-wall soft-annealed material.

Material so furnished is, for the most part, termed "mechanical tubing." This includes tubing used for all of the various applications where, due to its accurate cross-section, the tube lends itself to the construction of machinery or machine parts. The annular cross-section of tubing may be desirable because of its great stiffness and strength as compared with an equivalent-weight solid section; it may be desirable because its particular cross-section lends itself to the design in question; or it may be that

COLD drawing greatly improves the dimensional accuracy and the finish of seamless tubes, as in other sections. Some of the limiting conditions and measures of the changes themselves, were brought out in a paper by Geo. P. McNiff, National Tube Co., read before the Western Metal Congress. This extract of his paper sets forth the results which may be expected, from varying procedures in drawing and annealing, upon the physical qualities of the tubing.

the use of a hollow section will reduce, or eliminate, the machining required to adapt a solid section to a given use.

The chief market for such mechanical tubing is in the automobile industry, the reason being, of course, that in this industry a maximum of strength and a

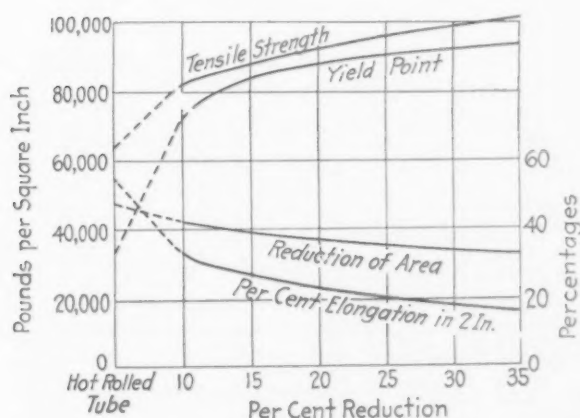


FIG. 3—Effect of amount of cold-drawn reduction upon the tensile and ductile properties of a hot-rolled tube of 0.30 per cent carbon steel. Strength is increased, while the ductility progressively decreases

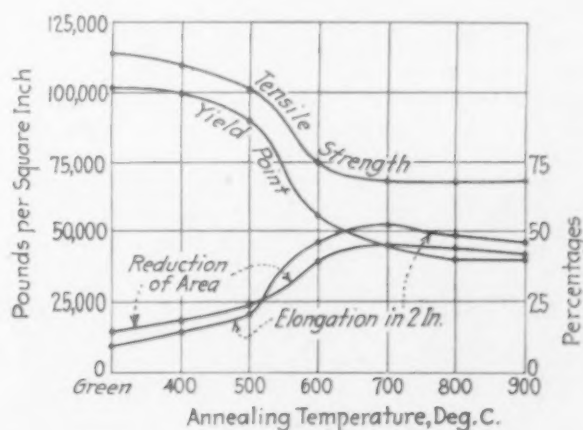


FIG. 4—Effect of increase in annealing temperature upon the physical properties of a cold-drawn seamless tube, reduced 35 per cent in sectional area from the hot-rolled tube and made of steel of 0.30 per cent carbon, with wall  $\frac{1}{8}$  in. thick.

minimum of weight are essential. Likewise, the intensive production which is characteristic of this industry demands raw materials which can be purchased accurately to size and be fabricated with little or no machining.

#### *Accuracy and Tolerances Obtainable*

IT is of interest to mention the accuracy of size and various properties of tubing which may be expected in commercial production.

Hot-rolled tubing can be produced in the smaller sizes, 2 to 3 in. in diameter, with a tolerance of  $1/32$  in. on the outside diameter. This variation, of course, is less than the usual practice on ordinary pipe, and applies only to hot-rolled *mechanical* tubes, when specified in sufficient quantities to permit the adjustment of equipment to meet this tolerance. The larger sizes can be produced with an outside tolerance of  $3/64$  in. to  $1/16$  in., depending on the size and the wall thickness.

When the wall of the tube becomes relatively light in proportion to the diameter, difficulty is encountered, due to ovality, which results from straightening and handling. The surface of hot-finished tubes is comparable with the surface of any similar hot-finished product.

Diameters of a cold-drawn tube, both inside and outside, can be controlled within very close limits. On tubes having  $1\frac{1}{2}$ -in. outside diameter and smaller, a maximum variation of 0.005 in. may be expected in the hard-drawn, or semi-annealed, condition. This variation increases with increasing diameter until at 5 in. outside diameter the maximum variation of hard-drawn material would be about 0.015 in. The surface of a cold-drawn tube is smoother than that of a hot-finished tube and is com-

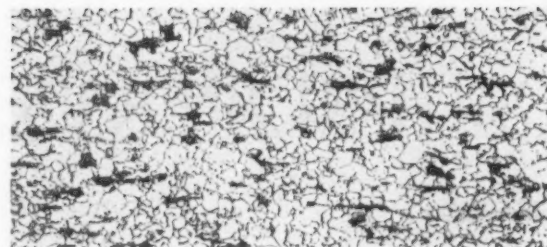


Fig. 7

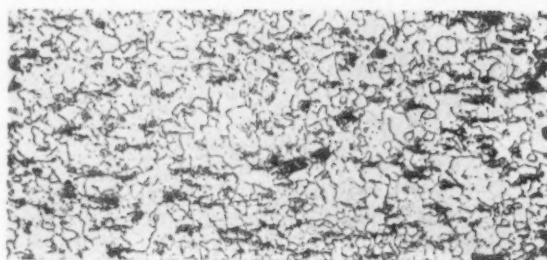


Fig. 8

**FIGS. 7, 8, 9, 10**—Structures of cold-drawn seamless tubing of 0.10 to 0.20 per cent carbon steel, reduced 50 per cent in area in drawing and subjected to various anneals. Magnifi-

parable with the surface of any other cold-drawn steel product.

Cold-drawn material lends itself particularly to those requirements where tonnage is not great and surface appearance and extreme accuracy of size are important. Additional possibilities are afforded in cold-drawn as compared with hot-rolled in the matter of physical properties, for within limits the physical properties of a given cold-drawn tube may be varied by the degree to which the mechanical hardness of cold drawing is eliminated in the final annealing operation.

#### *Character of Changes Produced by Cold Working*

When the physical properties of cold-drawn seamless tubing are considered, the factors which must be taken into consideration are the analysis, the amount of cold work on the tube and the extent to which the effects of cold work are eliminated in the final annealing. Fig. 3 illustrates in a general way the change in the physical properties of a 0.30 per cent carbon tube, beginning with the hot-rolled condition and followed by various amounts of cold working as measured by the percentage of reduction of the section in drawing. The properties of the metal in the hot-rolled condition may be considered as normal.

It will be noted that hardness, as measured by the yield point and tensile strength, increases with increasing cold work, and that there is a corresponding decrease in the ductility, as measured by the percentage elongation and reduction of area.

In Fig. 4 the diagram illustrates the effect of various annealing temperatures on the physical properties of the cold-drawn tube. In this particular instance a 0.30 per cent carbon tube which has had about 35 per cent reduction in cold drawing is illustrated, the curve being the product of a large num-

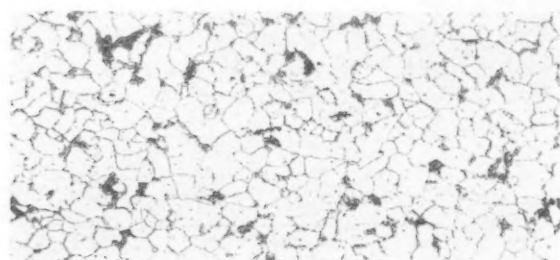


Fig. 5

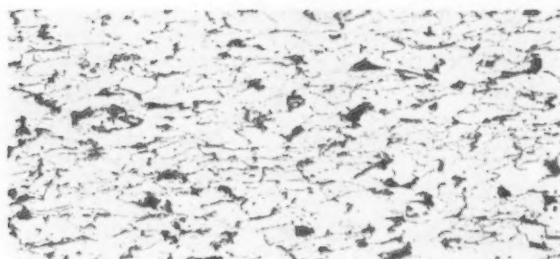


Fig. 6

**FIGS. 5 and 6**—Structures of cold-drawn seamless tubing of 0.10 to 0.20 per cent carbon steel, not annealed, reduced 10 per cent (Fig. 5) and 50 per cent (Fig. 6) in drawing. Magnification is 100 diameters; etched with 5 per cent nitric acid.



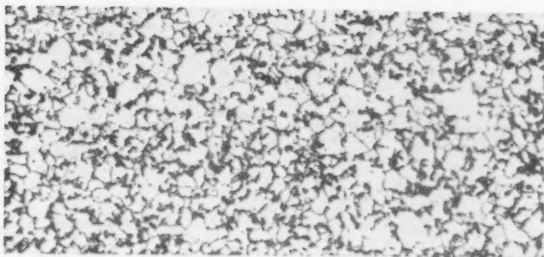


Fig. 9

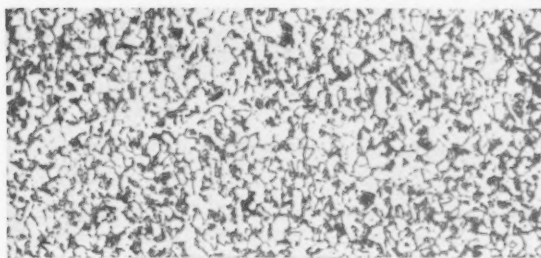


Fig. 10

cation is 100 diameters; etched with 5 per cent nitric acid. Fig. 7, annealed at 600 deg. C. Fig. 8, annealed at 700 deg. C. Fig. 9, annealed at 800. Fig. 10, annealed at 900 deg. C.

ber of tests. At 500 deg. C., an appreciable relieving of the hardness has resulted, and at 600 deg. C. a still further change is produced. From 700 to 900 deg. C. the change in physical properties is slight compared with the change produced at lower temperatures.

Recrystallization of cold-worked steel and iron begins at about 400 deg. C. This recrystallization is accompanied by the destruction of the effect of cold working, bringing about a gradual restoration of the original properties as found in the hot-rolled tube. As an illustration of the effect of cold work, microphotographs (Figs. 5 and 6) definitely indicate the effect of cold work on the grain structure. Microphotographs (Figs. 7 to 10) indicate the effect of annealing on this structure.

▲ ▲ ▲

## Welded Ship Withstands 11 Years of Hard Service

**E**LEVEN years ago the first welded ocean-going ship was put into service, in Great Britain. During the time since then this vessel has had a number of marine vicissitudes which have tested her structure so thoroughly that the method of construction has been regarded as vindicated. This ship, originally named Fullagar, was renamed Caria on change of ownership, and with another ownership change has now become the Shean. The following notes are taken from the *Engineer*, of London.

She is a small vessel, launched in February, 1920. The registered length is 150 ft., with a breadth of 23 ft. 9 in., and a gross tonnage of 398. Driven by a Diesel motor, her speed is 10 knots.

Several times the ship has been driven aground in heavy weather. Examinations later in drydock have shown that the keel and bottom plating with-

stood the excessive strain of grounding without any ill effects to the welded joints. On no occasion was there any leakage through the shell.

Seven years ago the ship, fully laden, went aground on a sandbank near Liverpool. Floating off on the next high tide, she was found water-tight, was sent on her voyage and discharged her cargo at Belfast. There it was found that she was damaged to a considerable extent, but in the absence of leaks was sent to Liverpool under her own power.

Thorough examination showed that the bottom had been bent inward through the entire width of the ship and for a length of about 70 ft., or nearly half of her length. The distortion was measured as 11 in. Inside structural work, however, showed that it had been considerably greater, but had been partly corrected by the ship's settling when placed on the blocks of the drydock.

Expert opinion was expressed at this time that the welding had stood a test which would have wrecked a riveted ship and made her a total loss.

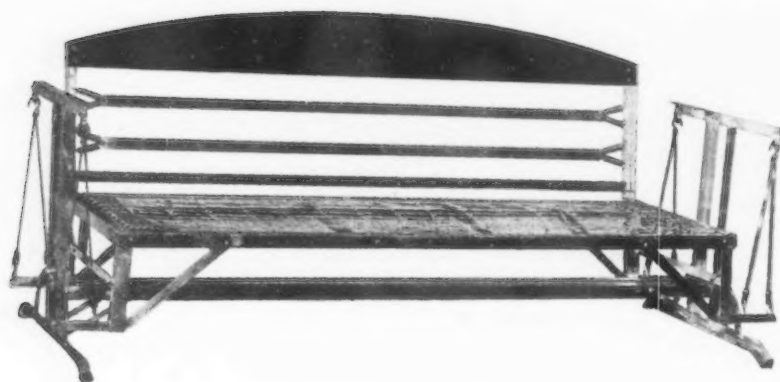
More recently, after the vessel had been sent across the Atlantic and into the service of her new owners in British Columbia, she struck a rock cliff when going at full speed, carrying 10,000 bags of cement (about 380 tons). Examination after the accident showed that those plates which had torn apart from this crash did not do so at the welds, but in the solid plate outside the welded areas. More than 11 years of prolonged exposure of the welds to sea water have left no trace of undue corrosion of metal in any part of the structure.

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## Manganese and Silicon and the Solidification of Iron-Carbon Alloys

**I**T is possible to differentiate between graphite precipitated as a stable phase and that derived from decomposition of metastably solidified phases by noting the solidification point and the form of the graphite. O. von Keil and F. Kotyza (*Stahl und Eisen*, Jan. 22, 1931) have studied in this manner the effects of manganese and silicon in iron-carbon alloys cooled at 54 deg. F. per minute on the fields of white iron, granular, and needlelike graphite. Under these conditions silicon exhibited a uniform tendency to decompose carbides. In the hypoeutectic range, pure iron-carbon-silicon alloys showed a white and a mottled field. Addition of 0.3 per cent manganese increased the white zone at the expense of the granular field while, near the eutectic composition, stable needlelike graphite was precipitated. With increasing manganese the needle zone was widened so that, at 3.5 per cent manganese the granular zone had nearly disappeared.

Evidently manganese favors the stability of the carbide at low-carbon contents and the formation of graphite at the high carbons. The form of the ground mass showed the favorable influence of silicon on ferrite formation. In the iron-carbon-silicon-manganese alloys this influence of silicon was evident at a lower silicon content in the zone of granular graphite than in the field of stable precipitation.



## PLANT MAKING OBTAINS BY MASS

**L**OWERED costs expected today by the buyer have been obtained by a modern household glider and hammock manufacturing plant, the J. R. Bunting Co., Philadelphia, through mass production, careful buying on the basis of a season's requirements, and preliminary fabrication of parts, so that during the season of demand, production is largely a matter of rapid assembly.

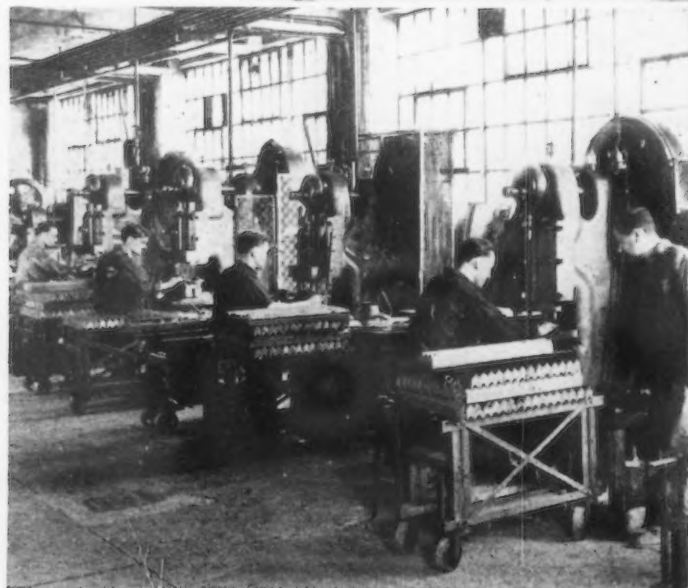
In the manufacture of all-metal gliders, hammocks and sun-couches, the active season begins in January

and usually continues into July or early August. Such is the demand today for gliders and hammocks that the company's output for the current season is scheduled at close to 75,000 compared with 45,000 in the 1930 season.

While a range of sizes and qualities of gliders is manufactured, the recent trend in retail buying toward lower priced products has brought an increased demand for small two-seat gliders to retail profitably at about \$8 and the Bunting company has through its

▲ ▲ ▲  
Angles, strip steel and other materials for assembly into gliders are placed in stock piles as close to the machines as possible.

▲ ▲ ▲  
Early in the season, angles are fabricated, ready for assembly into complete gliders when orders are received. This row of men and machines is punching holes for cold riveting. (Below)



methods been able to meet this requirement of lowered price coupled with sturdy construction.

About 4500 tons of steel are used in a year's production, consisting of light angles, flats, strip steel and wire, and in addition, chain, bolts and rivets. The angles are in lengths ranging up to 60 and 70 in., sizes  $1\frac{1}{4} \times 1\frac{1}{4} \times \frac{1}{8}$  in. and  $1\frac{1}{2} \times 1\frac{1}{2} \times \frac{1}{8}$  in. The frames of glider seats and hammocks are formed of heavy angles rolled from rail steel, which require only punching with holes for cold riveting.

Strip steel is required principally for basket weaving across the backs of gliders and in the seats of the lower priced products. Large helical springs are wound and tied under ten-



# SEASONAL PRODUCT LOWER COSTS OUTPUT

sion for seats in the more expensive grades of gliders.

In the metal fabricating department, such operations as punching and riveting angles, winding and tying helical springs, kinking and linking wire for seats, are carried out at right angles to a hand-operated monorail system, operating through every department of the plant. Branches of the system from each section converge on the final assembly room, where glider backs, seats and supports are packed with the upholstery into cartons and moved out to the railroad siding or into motor trucks.

As far as possible, materials are fabricated in advance of, or early in the season, angles being punched, strip steel cut to required lengths and punched, wire cut to length and kinked and large helical springs wound, tied and heat treated ready for assembly.

By this method, when an order for a certain type of glider is being executed, angles of required length are taken directly from the stock piles close to the riveting machines, cold riveted into the frame of seat or back, strip steel of proper lengths, already punched, is riveted in a basket weave, leaving one side unattached, and the piece passed to a workman, who inserts small, helical springs under tension along one side, or on the ends, hooking them into the frame.

After painting with enamel, a section is completed and ready for packing in a carton with other parts. A monorail system moves it into the painting department, where it is dipped in vats of green enamel, and still on the conveyor it is pushed into large baking ovens, where sections freshly painted remain 30 min. at 150 deg. F., after which they go directly to the final assembly room.

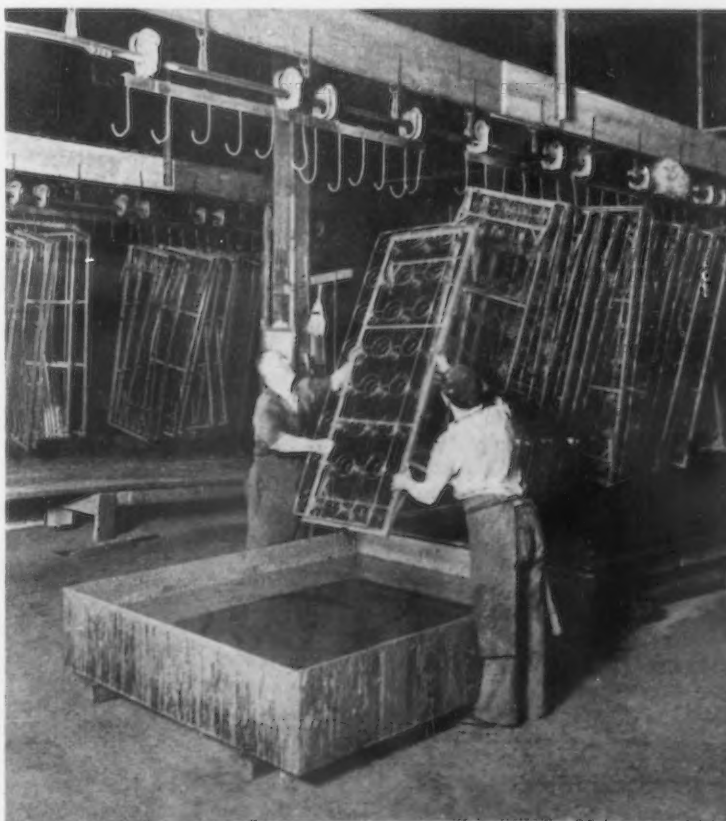
Angles for the side supports on gliders are placed in small presses and bent into an arch with a button pressed into each end of the legs to permit easy movement of the completed glider on a floor. Upright angles are then cold riveted to these bases. The sheet metal arms of the more expensive gliders are formed of No. 20 gage sheets well in advance of the season and may be readily riveted into the frame when an order for the better grade is being assembled.



Inserting small helical springs under tension in the seat of a glider.

In addition to using 1 1/4 in., No. 22 gage strip steel interwoven for seats, and backs, kinked wire is looped together with small loops of dead-soft flat wire. In this operation, the past year has brought an improvement in production. An automatic wire-cutting and kinking machine, and a looping machine

(Concluded on page 136)



Glider seats, backs and other parts are dipped in paint, after which they move into large ovens where the paint is baked at 150 deg. F. for 30 min.





**H. W. GILLETT**  
Managed all the details of  
the symposium and the  
discussions.

# SYMPOSIUM ON THE EFFECT OF TEMPERATURE ON METALS



**H. J. FRENCH**  
Chairman of the joint  
committee of the A. S.  
T. M. and the A. S. M. E.

THE first portion of the abstracts of the 28 papers which made up the notable symposium on the "Effect of Temperatures on Metals"—the feature of the annual convention of the American Society for Testing Materials at Chicago, June 22 to 26—was published in THE IRON AGE July 2, page 29. It included the abstracts made by L. W. Spring of 11 of the 28 papers. The abstract of the other 17 papers was prepared by H. J. French, research metallurgist, International Nickel Co., New York. Abbreviated from his review, the following covers high spots of the papers:

## Papers Abstracted by H. J. French

THE papers under review show that engineers and metallurgists no longer think of the effects of temperature upon the properties of metals solely in terms of "strength" or resistance to oxidation. Instead, they recognize the importance of a knowledge of a very wide range of properties, mechanical, electrical, chemical, etc., and that successful performance rarely depends upon only one, but usually upon a combination of good properties.

### Thermal Conductivity and Expansivity

A PAPER of special interest in this connection has been prepared by M. S. Van Dusen, physicist, Bureau of Standards, Washington, on the thermal conductivity of metals. The author points out that, in general, the thermal conductivities of pure metals decrease with increasing temperature, while those of many alloys increase, but these changes are only of the order of a few per cent per 100 deg. C.

The importance of a knowledge of thermal expansivity is discussed in a paper by N. L. Mochel, metallurgical engineer, Westinghouse Electric & Mfg. Co., South Philadelphia, Pa.

Four papers of the symposium dealt with non-ferrous alloy—zinc, aluminum and magnesium, copper and

bearing metals: "Zinc Alloys for High and Low Temperature Service," by H. A. Anderson, metallurgical development engineer, Western Electric Co., Chicago; "Mechanical Properties of Aluminum and Magnesium Alloys at Elevated Temperatures" by R. L. Templin and D. A. Paul, Aluminum Co. of America, New Kensington, Pa.; "Properties of Copper and Some of Its Important Industrial Alloys" by William B. Price, chief metallurgist, Scovill Mfg. Co., Waterbury, Conn., with printed discussion by W. H. Bassett, American Brass Co., Waterbury; and "Properties of Bearing Metals at Normal and Elevated Temperatures" by E. R. Darby, chief metallurgist, Federal Mogul Corp., Detroit. [Mr. French's abstracts of these are not included here.]

### Cast Irons

NOWHERE has the art of alloying been extended more effectively during the past five years than in the field of cast irons and no longer can the discussion of these metals be restricted to gray, white or mottled irons, malleable cast iron and so-called semi-steels.

Many of the advances made are of value for high temperature service and they deserve more detailed consideration than can be given to them

in this abstract, but at least attention should be called to two important developments: (1) alloy high strength cast irons are now available in which the improvements in properties are retained in part at elevated temperatures, and (2) promising methods are now available for the control of growth—that troublesome characteristic of ordinary old-fashioned gray cast irons.

Mention should perhaps also be made here of the good wear resisting properties of gray irons at different temperatures and of the fact that, as a general rule, they excel most other ferrous metals in resistance to "galling" or "seizing." J. W. Bolton and H. Bornstein point out in their paper "Effect of Elevated Temperatures on Mechanical Properties of Gray and Malleable Iron," that:

... Although the use of gray iron alloys for pressure-containing parts has been limited to a maximum temperature of 450 deg. F. by the A.S.M.E. boiler code, it is probable that this rating is unduly severe when applied to some of the better classes or grades of cast iron used today. In other fields gray iron castings are frequently used at temperatures up to 700 or 800 deg. F., and where service is not severe have been used at even higher temperatures. Where service conditions indicate that growth is not likely to be serious, the better classes or grades of gray iron castings probably can be used at temperatures up to 800 deg. F. Beyond this point it appears that the likelihood of graphitization will limit their use.

### Prevention of Growth

A possible practical answer to the question of prevention and control of growth of gray iron castings for use under especially severe operating conditions lies in the employment of special high-alloy irons of the austenitic type. Such irons are commercially

obtainable through the employment of high percentages of nickel, accompanied with smaller percentages of copper and chromium. Irons with 15 per cent or more nickel are gray in fracture, containing free graphite, just as do ordinary gray irons. The austenitic matrix indicates the absence of the usual transformation range changes, hence freedom from the dimensional changes occurring in this range.

The addition of 4 to 6 per cent copper and 0.5 to 2.0 per cent chromium materially enhances the ability of the material to resist corrosion and scaling influences, which increased resistance probably lessens the dangers from surface checking and penetration gases. The presence of chromium also possibly further stabilizes the retention of dissolved carbon and tends to minimize further graphitization.

(Mr. French said in connection with these, his abstracts, that there is abundant evidence to support the view that cast irons will become increasingly important in service at elevated temperatures and that further technical developments are to be expected in this group of metals within the next few years.)

### Carbon and Low Alloy Steels

**S**TEELS are among the most important of the commercial alloys for service at both high and low temperatures for reasons well known to all. They have received a great deal of attention in recent years and there has been accumulated a vast amount of data, only a very scant portion of which can be referred to here.

R. A. Bull points out that carbon and nickel chromium steels have been shown by Kanter and Spring to "give less creep in the cast condition than they do in the forged condition in all tests at 1000 deg. F., the difference being most marked at the highest loads. At 800 deg. F. and 10,000 lb. per sq. in., the flow curves for cast and forged samples practically coincide." Bull continues—

Seemingly at and above the "blue-brittle" or "equi-cohesive" range of temperature (around 550 deg. F.), or in other words at a point where there is more apt to be deterioration from heat than there is below that point, relatively large crystal formation, when present in steel of the carbon or low alloy grades, apparently aids resistance to flow. Consequently, other conditions being the same, a steel casting of a given composition, within the classifications included in our topic, is apt to show less deterioration from heat alone than does a steel forging or a part made of rolled steel. The comparatively large granular structure in the casting is, of course, due to the fact that it had no opportunity to be hot worked.

### Nitrided Steels

**S**INCE the 1924 symposium there have been developed commercially a group of steels susceptible of being surface hardened to very high hardnesses of the order of 1000 Brinell or more by nitriding. Some of these steels, especially those containing

aluminum, have properties of special interest at high temperatures and are described in a paper by O. E. Harder, Battelle Memorial Institute.

Resistance to abrasion, to adhesion, to galling, etc., are maintained at elevated temperatures, as is the hardness of the nitrided case. Harder states that "nitrided cases may be expected to retain their full hardness up to 750 deg. F." With further increase in temperature the case hardness falls off rapidly, but at 930 deg. F. the case hardness still exceeded that of high-speed steels.

In the field of low alloy steels the nickel steels have found increasing applications in locomotive boilers; the nickel-chromium steels similar to SAE steel 3130 or with slightly higher nickel and chromium contents are now practically standard in the construction of valves and for bolting materials for power plant and oil refinery service. Medium manganese steels are used in various applications, but perhaps the four elements most often employed in various combinations, in the low alloy steels for high temperature service, are chromium, tungsten, molybdenum and nickel.

The resistance to corrosion of the low alloy steels is often better than, but not radically different from, the corresponding properties of plain carbon steels at high temperatures. Hence, where appreciably improved resistance to corrosion is required, as in oil refinery equipment operating with "sour" crudes, the more highly alloyed steels are required.

### High Chromium Steels

**C**OMMERCIAL high chromium steels are roughly divided by C. E. MacQuigg, manager, Union Carbide & Carbon Research Laboratories, Long Island City, N. Y., in his paper "High-Chromium Steels for Extreme Service Conditions," into the following groups:

Group I.—Chromium 5 to 7 per cent; low carbon content (not over 0.3 per cent). These steels are easily forged and made into seamless tubes, sheet, wire, etc.

These steels are being developed for those applications where the corrosive influences preclude the satisfactory use of ordinary steels but are not sufficiently active to require the true stainless steels; or, the uses on such a large scale as to make the use of higher priced alloys out of the question at present.

Group II.—Chromium, 12 to 16 per cent. There are three carbon grades: (a) Below 0.10 per cent carbon—rust resistant without heat treatment. Readily workable. So-called "rustless

iron." (b) About 0.35 per cent carbon—mostly used in cutlery. Requires heat treatment to develop corrosion resistance. So-called "stainless steel." (c) Die steels with 12 to 14 per cent chromium and up to 2 per cent or more carbon; also being developed for abrasion resistance, but not for corrosion resistance.

This class embraces the low limit of chromium content which is capable of supplying a true rustless or stainless alloy. To improve the cutting quality and still maintain resistance to staining, the carbon may be increased in cutlery to around 0.50 per cent, in which case the chromium must be raised to 16 or 18 per cent, placing the alloy toward the next higher classification.

Group III.—Chromium 16 to 20 per cent. Usually the carbon does not exceed about 0.20 per cent for the worked alloys, but may go up to 0.80 per cent or more in the castings.

This group is the outcome of a need for greater resistance to corrosion than is afforded by the lower chromium ranges.

Group IV.—Chromium 25 to 30 per cent. Workable alloys do not usually carry more than 0.35 per cent carbon; castings contain up to 1.00 per cent or more for resistance to chemicals or oxidation; carbon up to 2.5 or 3.0 per cent for wear resistance.

These alloys maintain their surface stability regardless of heat-treatment.

Resistance to oxidation and sulphidation and, with the higher carbon contents, resistance to abrasion are perhaps the three outstanding properties of the chromium steels. Additions of elements such as tungsten, molybdenum and silicon improve corrosion resistance or the hot hardness, but in general the high chromium steels do not have the higher resistance to deformation at high temperatures found in the iron-chromium-nickel alloys, to be referred to later.

The resistance of the high chromium steels to oxidizing conditions is ascribed by MacQuigg to

the protective effect of the oxide coating formed. This oxide coating may be an invisible layer of the order of magnitude a few molecules in thickness which, according to Evans, develops passivity in a nitric acid solution; or, it may be the tough adherent non-permeable or refractory oxide scale which visibly forms at high temperatures. . . .

### Wrought Austenitic Alloys

**T**HE commercial austenitic alloys used for high temperature service contain: Chromium, 16 to 30 per cent; nickel, 7 to 30 per cent; carbon, 0.05 to 0.20 per cent, and silicon, 0.30 to 2.50 per cent.

According to R. H. Aborn and E. C. Bain, research laboratory, United States Steel Corp., Kearny, N. J., their distinguishing characteristics

are their extraordinary toughness and ductility, high resistance to impact, high capacity for work hardening, no capacity for hardening by heat treatment and their non-magnetic quality. An important reason for the employ-





ment of austenitic steels in the higher temperature region lies in the fact that gamma iron has a higher recrystallization temperature, a lower recrystallization velocity and therefore a greater resistance to change of shape than has alpha iron. The actual recrystallization temperature is, of course, dependent on the amount of previous cold deformation and the alloy content. Thus with a steel containing 20 per cent chromium and 7 per cent nickel after 50 per cent reduction recrystallization occurs at 1650 deg. F.

The applicability of these steels for high temperature service is ascribed by Aborn and Bain quite largely to the chromium,

presumably by virtue of its contribution of a thin continuous adherent film of oxide which is, at the same time, impermeable. It is of special importance that chromium contributes, in addition to ordinary strength, the valuable property of strength at high temperatures. The nickel present doubtless adds somewhat to the resistance of chemical action of the metal but it is thought that its principal contribution is through the agency of crystal structure modification in developing workability.

It should be pointed out that neither the iron-chromium alloys, the iron-nickel alloys nor the nickel-chromium alloys seem to have the "strength" at high temperatures that can be obtained from alloys containing all three of the elements nickel, chromium and iron. The high strength at high temperatures is therefore the result of the combination of these three elements, rather than to any one of them alone.

The plain chromium steels and the austenitic steels are both susceptible to embrittlement or so-called weld decay under certain conditions, but it is pointed out by Aborn and Bain that in the 18:8 alloys

the condition of impaired corrosion resistance is not irreparable; indeed a single heating will restore the metal to its full effectiveness against corrosion. The essential of the restoring treatment is the healing of the attackable regions by a uniform distribution of chromium. . . .

Furthermore,

In the field of oil refinery service, some investigators have reported that carbide precipitation does not appear to affect the corrosion resistance to any great extent, and that in all cases of failed tubes examined there was substantial evidence that failure was due to overheating to such a point that the creep stress of the alloy was exceeded with resulting rupture. . . .

Many different metallic elements have been added in small percentages to increase the stability of these alloys. Among these may be mentioned tungsten, vanadium, copper, aluminum, molybdenum, titanium and zirconium. As judged by the copper sulphate test it has been reported that these added elements act only to retard the change. . . . Increased nickel and chromium content has a similar effect.

While the peculiarities of the aus-

tenitic steels should be recognized and are described quite fully by Aborn and Bain, enough is now known of these effects so that the austenitic steels can be used commercially with satisfaction for a wide range of high temperature service.

#### *Iron-Chromium-Nickel Alloys*

THE iron-chromium-nickel alloys of commercial importance cover a much broader range of composition than the wrought austenitic steels already referred to. They contain chromium up to about 30 per cent, nickel up to about 85 per cent, and varying proportions of carbon, manganese and silicon, and frequently also other metallic elements such as tungsten, molybdenum, aluminum, etc. The older alloy compositions include the ones which, for many years, were synonymous with the term "heat resistant alloys."

According to N. B. Pilling and Robert Worthington, International Nickel Co., New York, who have prepared an extended summary of properties, the usefulness of the iron-chromium-nickel alloys for many engineering applications is not so much the result of outstanding individual properties as it is due to "a fortunate combination of physical and chemical characteristics." Hence, the alloys "have found application in a diversity of uses at temperatures ranging from far below atmospheric, as in apparatus for liquefaction of gases, to temperatures removed by but a few hundred degrees from their melting points, as in certain furnace parts."

The alloys as a group are resistant to oxidation and to corrosion, some have special electrical properties, and those containing large amounts of all three of the elements nickel, chromium and iron, either with or without added metallic elements, show relatively high resistance to deformation under sustained stresses at temperatures from 1000 to 1600 deg. F. or more. But despite the long usefulness and acquaintance with this group of alloys, much of the information which is necessary for intelligent application to engineering uses is incomplete and "a large part of that which is most closely related to practical utility consists of private engineering information often highly controversial in nature."

The iron-chromium, nickel alloys, say the authors,

. . . all share to some degree the susceptibilities of the constituent metals. Confining attention to two sources of corrosion which are of the greatest importance in high-temperature engi-

neering, chromium rapidly increases the resistance of iron to oxidation and to sulphidation, while nickel, also contributing a measure of oxidation resistance, increases, under certain conditions, the susceptibility to attack by sulphur. These general trends, while evident in alloys differing considerably in composition, may be entirely hidden by the sometimes powerful effect of other constituent elements, as carbon, silicon, etc., and even slight differences in the corrosive environment may result in great changes in its effect.

#### *Nickel and Its Alloys with Copper, Manganese, etc.*

NICKEL and nickel-copper alloys are widely used in handling steam since they exhibit the required combination of corrosion resistance and mechanical properties to give good performance in turbine blading, valve trim, regulator parts, and miscellaneous auxiliary equipment in power plants. Their properties are discussed in a paper by C. A. Crawford and R. Worthington, International Nickel Co., New York.

Nickel and the high-nickel-copper alloys are suitable for service at somewhat higher temperatures than the low-nickel alloys of copper and the copper-nickel-zinc alloys. Maximum operating temperatures for nickel and Monel are 850 to 1000 deg. F., while those for the low-nickel alloys of copper are 600 to 900 deg. F. They say:

The resistance to creep of nickel, nickel-copper, nickel-manganese and nickel-copper-zinc alloys is of a higher order than that of copper and the bronzes and brasses, somewhat lower than that of carbon and alloy steels and much lower than that of the chromium-nickel-iron heat resisting alloys. The essential point of difference is the temperature range in which the resistance to creep begins to drop at a relatively rapid rate. This change for nickel and the tougher nickel-copper alloys lies roughly at 800 to 1000 deg. F.; for the heat resisting alloys somewhat above this—and for the bronzes and brasses below this. The principal factor determining this critical range is the temperature range of recrystallization. . . .

Nickel exhibits somewhat better resistance to oxidation than do the copper-nickel alloys but not as good as that of the nickel-chromium or iron-chromium alloys. However, nickel protection tubes are often used when the conditions are not severe enough to require the more resistant alloys.

A recent and promising application of Monel metal is in contact with activated hydrogen and nitrogen encountered in the nitriding of steels. The authors point out that:

. . . Variable behavior has been experienced with different metals in this service. Use of nitriding furnaces has been too limited up to now to make a clear outline of metal behavior possible. As tentative conclusions, it may be stated that metals are more likely to suffer attack when in contact with gas that is actually cracking, that low-manganese content Monel metal is





more resistant than high (1 to 2 per cent); and that neither Monel metal nor nickel have given evidence of deterioration in the uncracked ammonia gas itself or in the gases formed after cracking, as these exist in nitriding furnaces.

#### Low Temperature Properties

The effects of temperatures below atmospheric—commonly called “low temperatures”—are encountered by materials of construction in the refrigeration and aircraft industries, the railroads, etc. They are discussed in a separate paper by H. W. Russell, Battelle Memorial Institute, but have also received attention in the papers prepared by some of the other authors, notably Bull, Templin and Paul, and Bolton and Bornstein.

In a critical review of available data Russell finds that:

Abrupt changes in the properties of metals and alloys as the temperature is lowered from room temperature are not to be expected. Exceptions are to be noted in such cases as the impact resistance of materials containing iron as ferrite and in the electrical conductivity of certain metals and alloys which abruptly become “super conductive.”

The changes with decreasing temperature may be generalized as follows:

Yield point.....	Increase
Tensile strength.....	Increase
Elongation.....	Probably small decrease
Reduction of area.....	Decrease
Impact resistance.....	Decrease
Hardness.....	Increase
Endurance limit.....	Increase
Modulus of elasticity.....	Increase
Compressibility.....	Decrease
Thermal expansion.....	Decrease
Specific heat.....	Decrease
Thermal conductivity.....	Increase
Electrical conductivity.....	Increase

\* \* \*

In closing, I should like to point out that the object in view in the preparation and presentation of this summary has been two-fold: (1) to give an idea of what the papers contain so that more of you will consult them in detail if you have not already done so, and (2) to give a bird's-eye view of the metals for high or low-temperature service.

▲ ▲ ▲

Fabrication of riveted and welded pressure vessels, tubular equipment, penstock piping, bends and forgings are described and illustrated in a bulletin issued by the Babcock & Wilcox Co., 85 Liberty Street, New York. This bulletin, which bears the title, “Special Process Equipment,” also contains data on a new welding technique which is claimed to produce welds equal to or better than the work metal in tensile strength, shock resistance, ductility and the ability to withstand repeated stresses. Production of alloy castings, including the usual heat-resisting alloys, the so-called stainless alloys, Nirossta KA2, high chrome-iron and intermediate alloys to resist corrosion and withstand high temperatures, are discussed.

## Roll-Neck Bearings of Micarta in 120-Deg. Segments

MICARTA, a phenolic resinous material of great strength, manufactured by Westinghouse Electric & Mfg. Co., is said to have given exceptional service as a bearing liner in wire, rod, bar and merchant mills. Representative installations, where the pressures are not excessive and the peripheral speeds vary from 100 to 1000 ft. a minute, have shown this material to be superior to other plain-type bearings for roll-neck service, it is stated.

Water alone is used as a lubricant,

ments, thrust block and housing. The radial segments usually are 120 deg. pieces so constructed that the wear at any point is at right angles to the grain of the material. The thrust block consists of a separate piece of Micarta, so mounted that maximum life is afforded, since the edge of the roll rubs against the grain. The thrust block and radial segments are assembled in a machined housing and are held tightly in place. The thrust collar is prevented from turning by a recess machined in the metal housing.

▲ ▲ ▲  
**R**ADIAL segment and thrust block (left foreground) are of Micarta, made to fit accurately into the housing.  
▼ ▼ ▼



without any change in the conventional cooling system. Impure water, containing weak acids and alkalis, has no effect on Micarta and may be used without damage to the bearing. Seizing and grabbing are said to be eliminated, due to the non-absorbing and non-warping qualities of Micarta. In addition, the peculiar characteristics of the bearing material reduce scoring to a minimum.

Particles of sand, grit and scale coming in contact with the surface of the bearing will imbed themselves and cause only the slightest scratching. This is due to the relatively low Brinell hardness of the material, which permits charging and eliminates scoring. Micarta bearings have a slight resilience, enabling them to withstand shocks and blows that damage and fatigue ordinary alloy liners.

The three essential parts of the bearing are composed of radial seg-

ments, thrust collar or radial segments may be replaced independently without any special machine setup. Distribution channels are machined in the bearing surface to provide for proper cooling and lubrication. A typical bearing assembly with component parts is illustrated.

Savings in power due to the low coefficient of friction and polishing effect of the material are said to reach 30 per cent. Additional savings are realized by the elimination of grease and oil, reduced roll maintenance and ease of replacement of either segment or thrust parts, combined with long life.

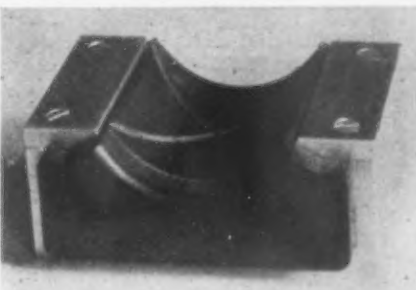
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### Malleable Castings Orders Off in May

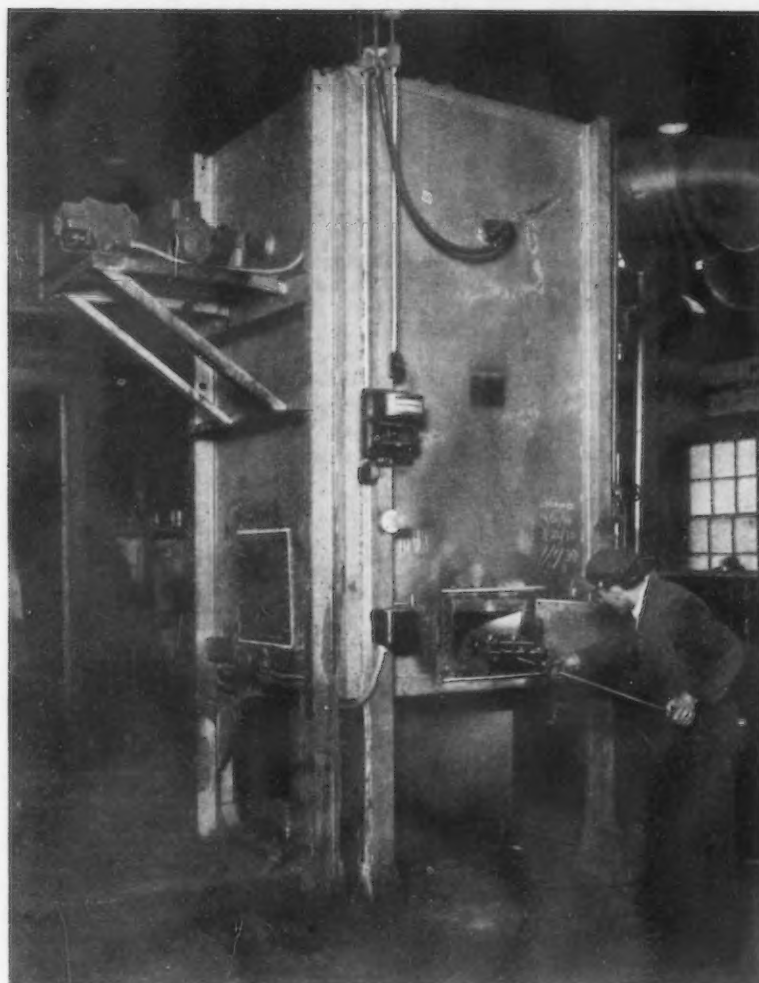
WASHINGTON, July 3.—Orders for malleable castings in May totaled 28,208 net tons, against 36,086 tons in April, according to Bureau of the Census reports from 115 establishments. Production was 31,344 tons, or 32.1 per cent of capacity, against 36,076 tons, or 36.3 per cent of capacity, while shipments were 36,686 tons, compared with 37,693 tons.

▲ ▲ ▲

Total production of babbit metal in May by 43 plants reported to the Bureau of the Census was 2,408,781 lb., compared with 2,560,243 lb. in April.



Assembled block of 120-deg. radial segment.



## TOWER TYPE ANNEALING FURNACE



By E. W. CUNNINGHAM

Industrial Heating Engineering Department,  
General Electric Co.,  
Schenectady, N. Y.

THE furnace is electrically heated and has an atmosphere of a non-explosive mixture of nitrogen and hydrogen gases. ▲ ▲ ▲

THE possibility of eliminating heavy scale or oxide from ferrous and non-ferrous materials during heat treatment presents a subject worthy of consideration by metallurgists and heat treaters alike.

The application of the artificial atmosphere electric furnace to this purpose clearly demonstrates the fact that not only can clean work be produced but marked economies can be effected through the elimination of pickling, sand blasting and drying operations.

One of the latest installations of this kind in a General Electric plant is a tower-type recuperative furnace developed and applied to the continuous annealing of refrigerator check valve shells. This so-called tower furnace utilizes a controlled non-scaling atmosphere consisting of a mixture of 5 per cent hydrogen and 95 per cent nitrogen. Hydrogen and nitrogen in these proportions form an atmosphere that is very slightly reducing but at the same time is absolutely non-inflammable.

The basic principles of scale-free heat treating as applied to this particular furnace are in no way new or

involved. The air of the furnace is displaced by an artificial atmosphere free from oxygen. The work is placed in the furnace, brought up to temperature and slowly cooled well below the scaling point before exposure to the air. However, the design of the furnace embodies features that are somewhat new and unique.

The reproduced photograph shows the operator charging the furnace and indicates clearly the character and manner of loading, as well as the light, heat-resisting alloy baskets that carry the work through the furnace. The drawing shows the heating chamber, the recuperative chamber, the cooling chamber and numerous details of the installation.

The work is loaded into baskets by hand and placed on the conveyor by means of a loading fork as shown. The conveyor carries the baskets up through the recuperative chamber into the heating chamber where the temperature is automatically controlled at 850 deg. C. From the heating chamber the baskets are carried back through the recuperative chamber into the cooling chamber and to the door for unloading.

The furnace is semi-automatic in operation. An electric timing device is set for any cycle desired, depending upon the nature and character of the work. When the conveyor is in position for unloading, the timing device stops it and energizes a signal light, thereby warning the operator. As soon as the basket is removed and replaced by another (an operation requiring only 15 sec.), the conveyor is again set in motion by a hand controller located conveniently at the left of the door opening.

Burners located above and below the door provide a curtain of city gas across the opening when charging and discharging the furnace. The gas is automatically ignited when the door is opened and shut off when the door is closed. The gas curtain thus serves as an effective seal to prevent the entrance of air to the furnace and burning out any air trapped in the shells.

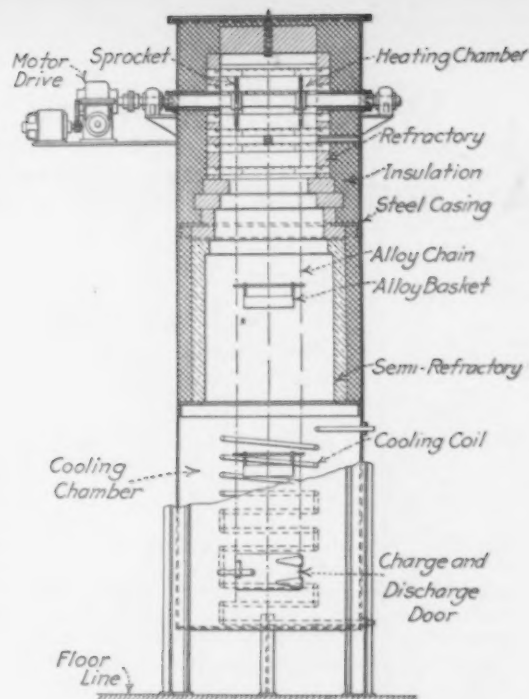
The furnace has a connected load of 20 kw. at 68 volts, 1 phase. The heating units are made of nickel-chromium resistor ribbon formed into sinuous loops and spaced on alundum compound insulators built into the

furnace lining. The heating and recuperative chambers are lined with fire clay refractory and backed with insulation brick. The steel casing is adequately braced by structural members and welded gas tight throughout. Forced cooling is provided by circulating water through coils located inside the cooling chamber proper.

The conveyor consists of two continuous chains made up of heat-resisting cast alloy links. The chains are tied together every 15 in. in the length by alloy rods from which the baskets are suspended when in the furnace. The chains travel over two alloy sprocket wheels mounted on an alloy shaft in the top of the heating chamber, and return over cast-iron sprocket wheels mounted in floating bearings, at the bottom of the cooling chamber. The driving mechanism, consisting of a small induction motor and the necessary reduction gearing, is mounted on a shelf on the outside of the furnace casing and is directly connected, through a gas-tight outlet bushing, to the alloy driving shaft on the inside.

This furnace has been in operation for some time and is giving very gratifying results. The gradual heating of the work prior to entering the

PRODUCTS to be annealed are lifted through the recuperative chamber into the heating chamber and then returned through the recuperative section to the cooling chamber.



heating chamber and the gradual cooling down before entering the cooling chamber is found to eliminate distor-

tion of the light steel shells. The tower-like design saves considerable space.

## Tempering Over 30,700 Springs a Day

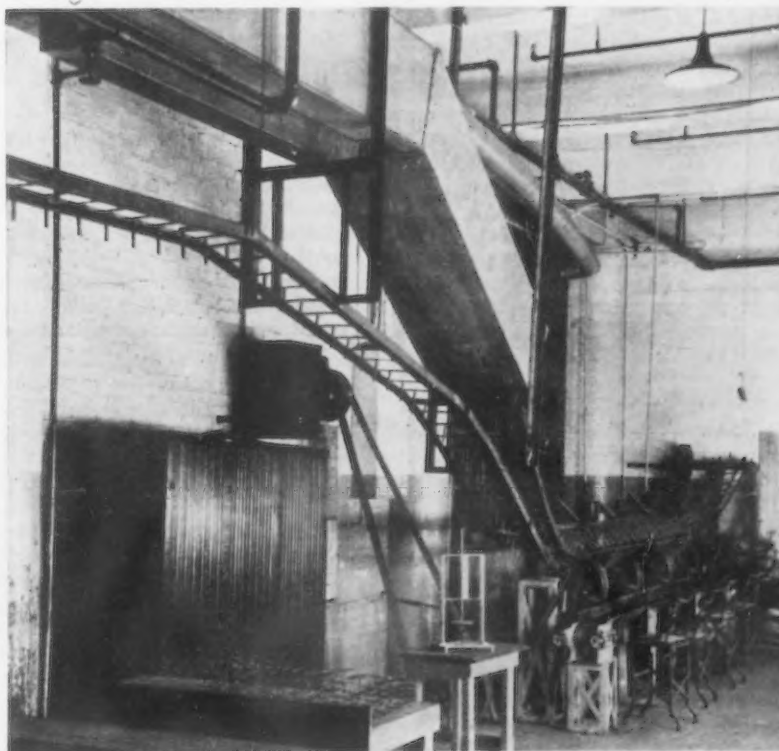
A FURNACE which is reported to temper 30,720 springs a day has been installed in the plant of the United States Bedding Co., Minneapolis. This furnace is of the elevated continuous conveyor type and was built by the Despatch Oven Co., Minneapolis.

As shown by the illustration, the furnace is mounted entirely on the ceiling of the building and is of double-wall construction, having 5 in. of rockwool insulation. The tempering chamber is 30 ft. long and is heated by atmospheric bar burners mounted underneath the furnace. The average operating temperature is between 400 and 650 deg. Fahr., depending on the type of springs to be tempered. The furnace is under automatic temperature control.

There are four knotting machines in the plant. The coils for the springs are brought to the operators of these machines on a small conveyor, which is synchronized with the furnace conveyor. Operators take these coils as they are delivered, knot them, and place them on the pegs of the furnace conveyor, which takes them through the tempering chamber. The constant speed of the conveyor system is 35 ft. per min., which gives a furnace capacity of 64 springs per min. The tempering period is a little less than one minute.

At the unloading end of the tempering oven, there is an 8-ft. cooling section, which allows the springs to cool without any handling. Due to the efficient insulation and design of

the furnace, the builder claims that operating costs are very low per unit spring, and that the smooth and continuous operation assures a steady production schedule.



This heat-treating oven developed by the Despatch Oven Co. operates under vapor tension thermostatic control, and provides economy by reheating and recirculating the air used.





## Welding Allegheny Metal and Other "18-8" Alloys

By G. VAN DYKE,  
Manager Special Steel Department,  
Joseph T. Ryerson & Son, Inc., Chicago



ALLEGHENY metal is a chrome-nickel iron alloy containing approximately 18 per cent chromium, 8 per cent nickel and small amounts of manganese and silicon. The carbon varies from 0.15 to 0.06 per cent, depending upon the class of work for which it is to be used and also upon the method by which it is to be fabricated. This alloy lends itself to welding by the electric or gas processes.

It is important to bear in mind that the welding of this alloy should be done in such a way that neither the analysis nor the structure of the metal will be changed; for this reason, the chemistry of the flame in gas welding is of vital importance.

A primary consideration in the gas welding of Allegheny metal is to obtain the proper mixture of acetylene and oxygen. If an excess of oxygen is used, it will burn or oxidize a considerable portion of the chromium; this not only changes the analysis of the metal but produces oxides of chromium which will cause the metal to boil, resulting in welds that are porous and of low corrosion resistance. If an excess of acetylene is used, the molten metal will absorb a certain amount of the gas and the carbon content of the weld will thereby be raised. This increase in carbon content is very detrimental to the corrosion resistance and produces a brittle weld.

### Neutral Flame Is Ideal

From what has been said it would appear that an exactly neutral flame with no excess of either acetylene or oxygen would be desirable, and if it were possible to maintain such a flame, it would probably be ideal. In actual practice, the regulators are not sufficiently accurate to produce a truly neutral flame and, therefore, the lesser of two evils must be chosen—the flame should be adjusted to give a slight excess of acetylene which is indicated in the flame by very short "feather tips" on the end of the combustion buttons. The gas welding torch should be held as close to the

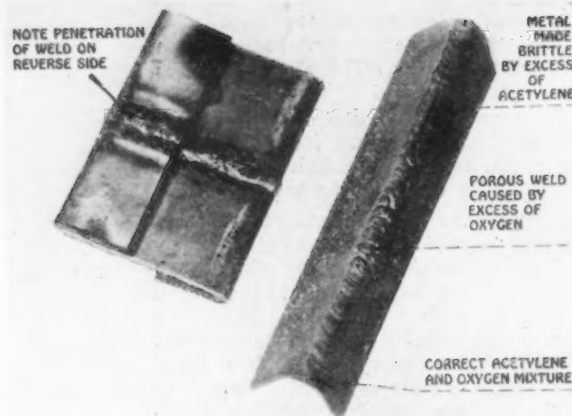
metal as possible, so as to push the flame down into the weld; the rod should be held above the weld so it will melt and drop down as the work progresses. Puddling should be avoided, as it tends to produce a porous weld. If the flame is adjusted properly and sufficient heat is used, the Allegheny metal rod will melt freely and will drop down in clean drops.

If a flux is to be used, "Chrom-aloy," made by the Oxweld Acetylene Co., may be employed; this flux has a tendency to make the metal flow a little more freely and is of assistance in securing deeper penetration. A tip, one or two sizes smaller than would be used on the same gage of steel is recommended. In most cases, about 5 lb. pressure on both the acetylene and oxygen will be sufficient. It is essential that accurate regulators be used so that a uniform mixture can be maintained continuously.

### Rod Important in Electric Welding

In the electric welding of Allegheny metal by the metallic arc process, we do not have to concern ourselves with flame chemistry. It is important, however, that the rod be of the proper analysis and that the coating on the rod be such that it will produce sound welds, deep penetration and a bead of equal corrosion resistance to that of the parent metal.

Reversed polarity should be used; that is to say, the electrode should be connected to the plus pole of the generator and the work, or ground, connected to the negative pole. It is well to use rather less power than would be employed for welding steel of a similar gage, although this is a point that is best worked out by each operator for himself. Some operators can weld more rapidly than others and, therefore, can use a greater amount of heat. After a little experience an operator will find the best voltage and amperage setting for his particular machine on various gages. The welding outfit should have flexible controls because any variations in voltage and amperage are



THE sample at the left is No. 10 gage Allegheny metal bent flat after electric welding. Importance of proper regulation of the flame in gas welding is demonstrated at the right.

rather critical on this type of alloy.

A short arc should be used because it will give a more uniform penetration and because there is less chance of the molten metal becoming oxidized by a short arc and thus producing porous welds. Backing-up is to be recommended where possible and, in each case, the operator should be provided with samples on which to experiment for power adjustment and arc length before he starts on the job.

The scale produced on these welds is usually heavy and hard, and it is desirable to grind off the scale from the bead left by one rod before starting the continuation of the weld with the next rod.

There are certain general principles concerning all types of welding on Allegheny metal and the following are offered for careful consideration.

### Oxidizes Above 500 Deg. F.

In the first place, when this metal is heated above 500 deg. F., it will discolor or oxidize on the surface. This oxide must be entirely removed as it will cause rapid corrosion that will spoil the appearance of what might otherwise be a good piece of work. Oxidization can be removed by grinding, or can be taken off by the application of a mixture of one part of commercial nitric acid to one part of commercial hydrochloric acid. This acid mixture is extremely powerful and should only be left on the metal for a sufficient length of time (probably a few minutes) to remove the discoloration. It is absolutely essential that every trace of the acid be removed from the metal, first by rinsing with water and then by a thorough washing with soap and water in which has been dissolved some sal-soda, ammonia or other alkali.

If Allegheny metal is to be used to resist severe corrosive attack, it is essential that it should have the proper structure. The carbon content of the metal should be in solution in the iron and not in the form of

carbides which are chemical combinations of iron and carbon.

It is unfortunately true that metals of the 18-8 type, if heated to temperatures within the range of 550 to 1550 deg. F., for certain periods of time, depending on the temperature, will undergo a structural change in which some of the carbon will be precipitated from solution and converted into an iron carbide, or perhaps an iron-chromium carbide. These carbides accumulate along the grain boundaries of the metal, and if the metal is then subjected to heavy corrosive attack, electrolytic effect is developed which will cause rapid and destructive corrosion.

#### Preventing Carbide Precipitation

During the welding process the metal is, of course, heated to these temperatures at some points, and, therefore, there is always an area adjacent to the weld having a lower corrosion resistance than the parent metal. This change of precipitation does not occur instantaneously, but requires a certain amount of time to develop. It is obvious that because a No. 24 gage sheet will cool more rapidly than a 1/4-in. plate, precipitation is less likely to occur in light gage work than in heavier thicknesses. Experience has indicated that Allegheny metal used for soda fountain, restaurant and similar equipment is subjected to corrosion of such a mild type that carbide precipitation need not be considered. On the other hand, the calcium bisulphide solution used in the sulphite paper industry is so highly corrosive that all welds must be treated to eliminate this precipitation of carbides. Between these two extremes each application should be considered from the standpoint of the degree of corrosion and also the probability of carbide precipitation, which in turn is governed by the technique of welding and the thickness of the metal.

It should be noted that where carbide precipitation has occurred, it can be eliminated by heating the metal to a temperature of about 1950 deg. F. This heating should be followed by a cooling sufficiently rapid to prevent further precipitation. The method of cooling will, of course depend on the thickness of the section and the details of such operations should be discussed with the manufacturers of the metal.

Although when heated, metals of the 18-8 type will expand about 50 per cent more than steel, their heat conductivity is only about one-half that of steel. These two factors tend to make the metal warp more than steel—a characteristic that should be considered in all welding jobs. Jigs must be used to hold warpage within practical limits. Allegheny metal welds are extremely tough, however, and any welds made on metal of No. 10 gage or lighter should stand bending flat on themselves without fracturing.

## Offers Smaller Two-Spindle Horizontal Boring Machine

A TWO-SPINDLE horizontal boring, drilling and milling machine, designated as the No. 30 and similar in design to the larger No. 70 machine described in THE IRON AGE of June 4, has been announced by the Giddings & Lewis Machine Tool Co., Fond du Lac, Wis. It is obtainable in floor, table and planer types, a 48-in. vertical adjustment of the cutting head being provided in each case. The main spindle, 3 in. in diameter, is designed for 36 cutting speeds in geometric progression from 8.3 to 500 r.p.m.; the auxiliary spindle is of 2-in. diameter and gives an additional 36 speeds, from 25 to 1500 r.p.m.

There are 18 feeds for each spindle, ranging from 0.007 to 0.375 in. per revolution for the main spindle, and from 0.002 to 0.125 in. per revolution for the auxiliary spindle. Operating controls are similar to those of the larger machines. A handwheel is provided at the upper left-hand of the head for slow hand-feed to either spindle.

A separate mechanism for milling feeds is built into the front head-end of the bed. These feeds, which range from 0.8 to 40 in. per min., are obtained from a separate drive-shaft independent of the start, stop and reverse clutches. Accordingly, reversal of the machine does not reverse the feed or rapid traverse. The rapid traverse of 120 in. per min. is always in the same direction as the feed. Both are engaged by convenient levers that are moved in the same direction in which the unit is to feed or traverse. This directional control of each unit of the machine independent of the other units is emphasized as being

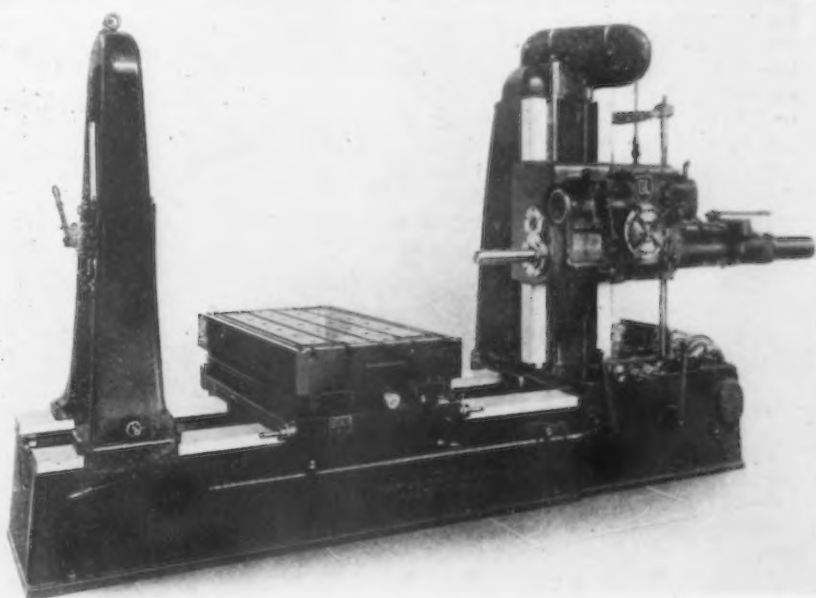
of special advantage in profile milling operations.

The entire head is automatically lubricated by means of a pump that delivers lubricant to a distributor at the top from which oil is directed to all moving parts. A large coolant tank is cast integral with the bed which is of heavy box-type construction and internally ribbed. The table is of semi-steel, also ribbed. It is provided with stop holes and five T-slots extending the entire length of the top. The bottom of each T-slot is drilled to permit chips to fall through the center cored hole.

A wide selection is available in the size and travel of the various units. The maximum distance between spindle nose and end support of the table-type machine may be made as great as required. The maximum table size obtainable is 36 x 72 in. On the planer-type machine the table may be as large as desired. Floor-type machines can be designed to suit requirements as to length of travel of the column on the runway and dimensions of the floor plate. The power required for operation is 15 hp.

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Both common and preferred stock of the Wheeling Steel Corp., Wheeling, W. Va., will be listed on the New York Stock Exchange as certificates therefor are issued on and after July 1. Issuance of the new stock is in accordance with the change in capital structure of the corporation, which was approved by stockholders on June 2.



Obtainable in table, planer and floor types, this two-spindle machine provides a 48-in. vertical adjustment of the spindle head and a wide range of cutting speeds and feeds.

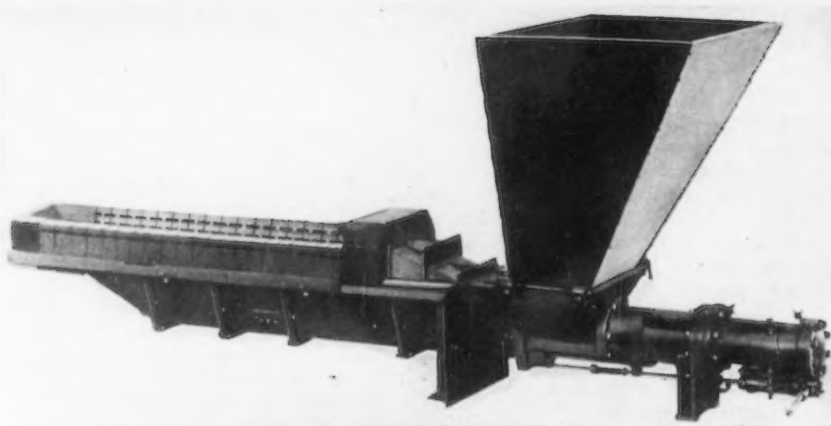


## Stoker Has Automatic Feed Control



**H**YDRAULICALLY operated underfeed stokers for boilers ranging from 25 to 350 hp. are now available from the Delta Co., North Chicago, Ill. This stoker, of the single-retort type, is regularly furnished with a separate drive unit which consists of a variable-delivery hydraulic pump, a centrifugal fan and an electric motor.

The retort is made of cast iron with transverse joints, thereby permitting the retort to be lengthened or shortened to suit various conditions. The tuyeres are cast from heat-resisting iron. The working end of the ram is fitted with a renewable face, which is cupped to provide a



Sectional construction of the retort of this stoker makes it easy to adjust length to conditions.

cutting edge for breaking lumps of coal.

Receivers and cylinders are made of cast iron and hoppers are constructed of heavy-gage copper-bearing sheet steel. Cast iron pistons are fitted with three or more rings.

Air delivered by the fan passes beneath the stoker, where it is slightly preheated before passing through tuyeres to the combustion zone. Air is admitted also through special cast tuyere blocks mounted in the setting wall at the clinker line. On the smaller sizes of stokers the cast iron

dead plates are stationary, the ash and clinker being raked to the front of the setting and out through roller-type doors that permit the hopper to be set close to the front wall. The larger stokers are equipped for side dumping. Live step plates, through which air is admitted, may be had when refuse and shavings are used as fuel.

Air supply to the stoker may be controlled either manually or automatically. The automatic control of coal feed operates on a 5 per cent variation of boiler steam pressure.



## Bar Straightener for Use on Billets

**A** BAR straightening machine or bulldozer for round or square billets from 3 to 12 in. in size has been brought out by the Aetna-Standard Engineering Co., Youngstown. The unit shown in the accompanying illustration is said to be one of the largest machines of its kind ever built. Billets to be made commercially straight are fed to the machine either by hand or from roller tables, depending on the size of the work.

To facilitate turning the billet in the machine, a roller lifting device is provided. It is actuated through a

bell-crank and link connection by an air cylinder shown at the lower left-hand end of the machine in the illustration. The ram is provided with a power-driven adjustment for accommodating work of various sizes. The adjusting nut of this mechanism is driven by a small motor through gears and a flexible coupling. Graduated dials mounted at each side of the housing enable the operator to set the adjustment properly for any size of billet within the range of the machine.

The main drive gear and pinion are of the double-helical tooth type; spur gears are employed for the secondary gearing. The ram, as well as its crankpin, is of heavy forged-steel construction. The anvils, which are ad-

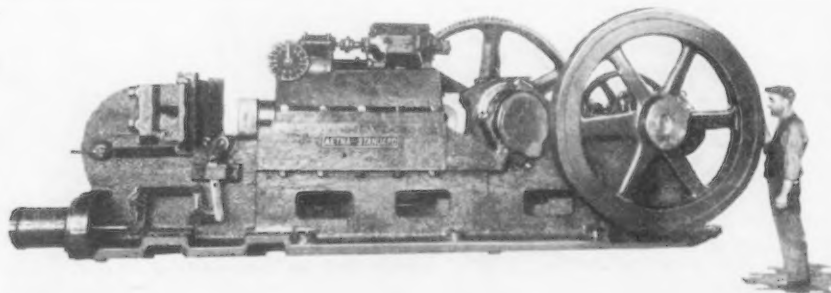
justable to various center distances from 20 to 60 in., are made of cast steel. Lubrication of the drive gears is by means of a splash system; all other moving parts are lubricated through a high-pressure grease system.



## Small V-Block Clamps for Light Work

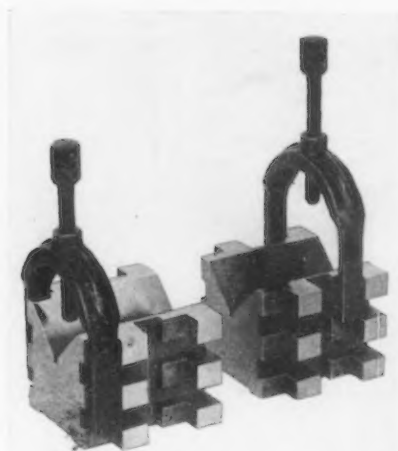
**N**EW small tools recently added to the line of the Brown & Sharpe Mfg. Co., Providence, R. I., include a pair of V-blocks and clamps designated as No. 750B and a V-block designated as No. 750C. Designed primarily for machinists and inspectors, the V-block and clamp set is provided with stepped clamping lugs that permit the blocks to be used on their sides, as the clamps do not project. They are made only in numbered pairs as illustrated. All sides of the blocks are ground at right angles and the ground V-grooves are accurately centered and aligned for each pair. Each block is made of hardened steel, 2½ in. long, 2¾ in. wide and 2 in. high. The drop forged clamps have hardened screws and will hold stock up to 2 in. in diameter.

V-block No. 750C, designed to leave the entire upper part of the work accessible for milling keyways or other

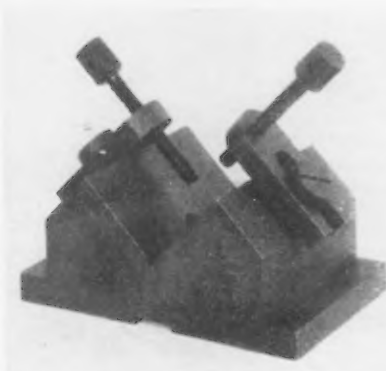


An air-operated roller lifting device for turning the billets, and a motor-driven ram adjustment are features of this large bulldozer.





THE blocks at the left are ground in pairs and may be used to hold round or rectangular work in various positions. Below: A V-block designed to leave the upper part of the work accessible for machining.



light machining, has clamps that will hold square, rectangular or round stock up to 1½ in. in diameter. A hole through the center of the block permits tools to project through the work and a tongue in the bottom is a convenience when the block is used on a machine table where it can be clamped by the flanges. The clamps

and screws are hardened and the bottom of the block is ground. The block is made of hardened steel, 3 in. long, 4¾ in. wide and 2 in. high.

## Flexible Metal-Parts Cleaning and Drying Machine

COMPACTNESS, flexibility and cleanliness are features claimed for the automatic washing, rinsing and drying machine illustrated, which is being marketed by the Metalwash Machinery Co., 117 East Twenty-fourth Street, New York. This machine, of drum type, for parts that lend themselves to tumbling, combines three distinct functions in the one unit and may be utilized separately for washing, rinsing or drying, or for any two or all three of these operations. Designed for one-man operation, it effectively removes grit, dirt, oil and chips from screw machine parts, stampings, castings and other small parts.

### Steps in Cleaning Process

Work dumped into the loading chute is carried by a helical screw in the perforated drum guides past the wash and rinse sprays and automatically discharged into the dryer drum. The latter returns the clean and dry metal parts close to the loading station where they are discharged automatically into a container and then removed by the operator. If only washing and rinsing is required, the material can be discharged into containers at the end of the rinse section by a special chute which by-passes it from the dryer drums.

The standard machine has a 15-in. diameter rotary drum, but other sizes can be furnished and larger machines

made to suit individual requirements.

The housing is of heavy sheet steel and has a reinforced removable hood to permit access to the spray sections. The tank seams are riveted and

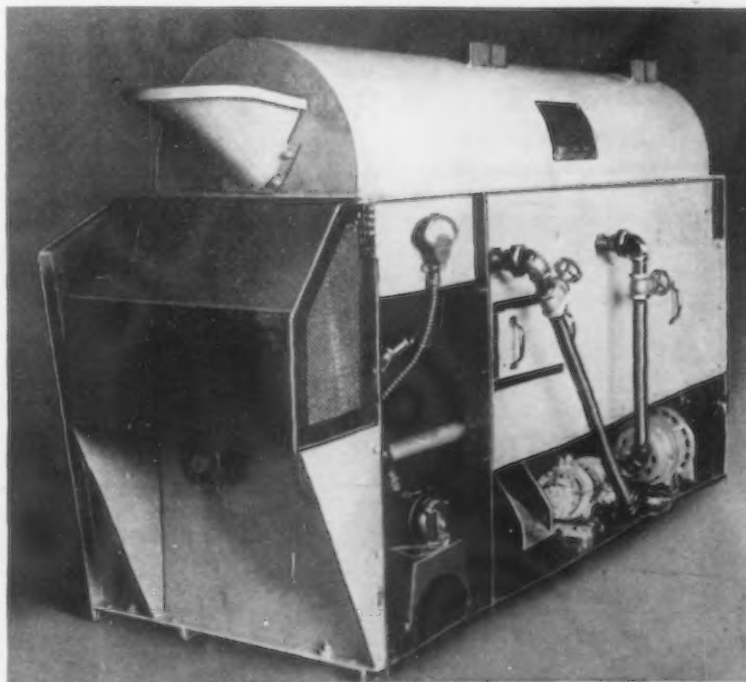
welded. Motor base plates are part of the structure, and gear guards are provided where necessary. The rotary drums are of perforated sheet steel, with the helical screw welded solid to the inside. The drums, supported by rollers on heavy drive shafts, are driven from the outside through sprockets and roller chain connected to a speed-reduction unit. Sprays with special nozzles force solution against the work at suitable pressures up to 20 lb., at the nozzle. The drying system provides for hot air recirculation by a motor-driven exhaustor.

### Choice of Heating System

The heating system for the wash tanks is adapted for steam coils with automatic steam traps for maintaining the heat and steam injectors for quick heating. Galvanized radiating fin booster coils with automatic steam trap are provided for the dryer. The wash tanks may be furnished also with electric immersion heaters and the dryer with electric air heaters. For gas heating a special submerged heating system is supplied.

The pump is of the double, two-stage centrifugal ball-bearing type and is fully protected from clogging. Constant-speed drive for drums is provided but variable-speed equipment can be supplied. The pump, exhaustor and drive are direct connected to motors, no parts being driven by belts. Lubrication is by means of the Alemite system.

In addition to the features noted above, combining the wash and dryer tanks into one housing and the recirculation of the drying heat are emphasized as reducing the cost of heating.



Screw machine products and other small parts are automatically washed and dried, all dirt, oil and chips being removed. The wash tanks and dryer may be heated by steam, gas or electricity.

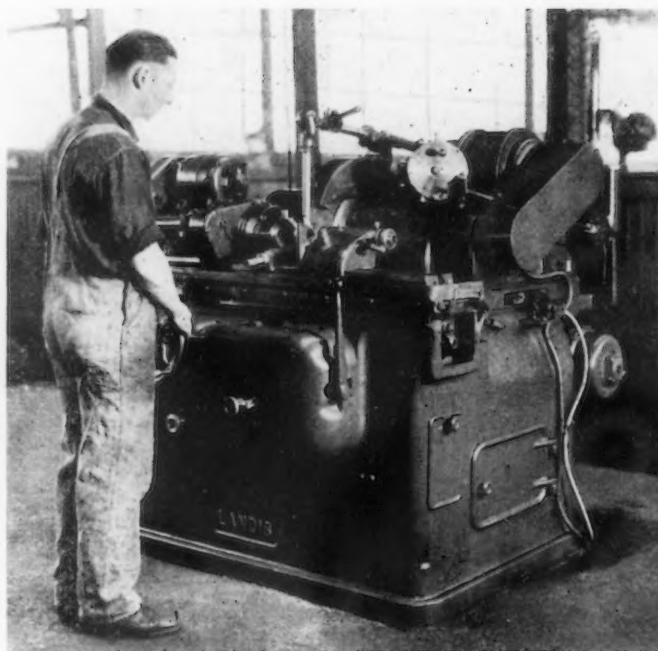
## New Small Plain Hydraulic Grinding Machine

**H**IGH output coupled with unusual ease of operation are emphasized by the Landis Tool Co., Waynesboro, Pa., in announcing its new type C 6-in. plain hydraulic grinding machine, which is recommended for use on light shafting, small bearings and similar pieces. Ease of operation is obtained not only by smoothness of all machine movements but by handy grouping of all controls.

Hydraulic table traverse provides speeds ranging from 6 to 240 in. per min. All control mechanisms are accessible; it is pointed out that none of these units is entirely within the bed, which is of box type with integral coolant reservoir. The work carriage traverses on one flat and one V-shaped guide, the latter having one side vertical. These guides have chilled surfaces, and the guideways are flood lubricated with filtered oil from the same Tuthill internal geared pump that furnishes the hydraulic pressure for operation.

The grinding wheel-head is supported by a V and a flat guide with chilled surfaces. Its spindle is mounted in steel-backed babbitt bearings that are continuously lubricated; the drive to the spindle is through multiple V-belts from a motor mounted at the top of the wheel base

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**HYDRAULIC**  
table-traversing mechanism is standard; automatic hydraulic wheel feed mechanism is obtainable as special equipment.  
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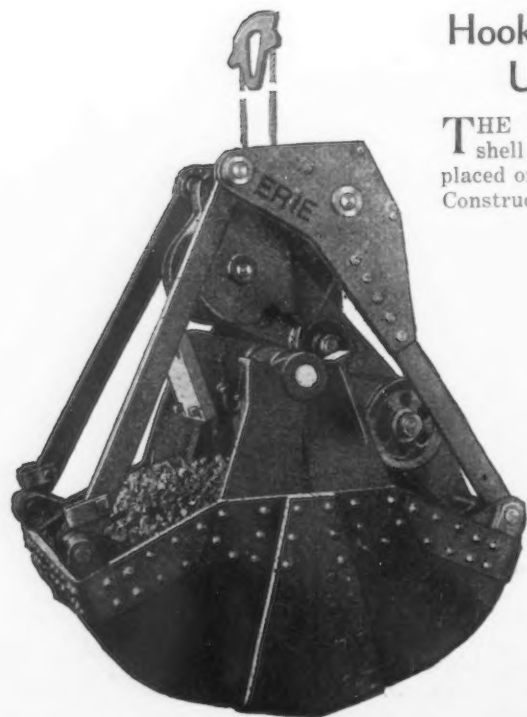
casting. An 18 x 1½ x 8-in. grinding wheel is standard. The table traversing mechanism is of the twin-cylinder type with a control valve to govern the flow of oil from the end of one cylinder to the corresponding end of the other, an arrangement featured as assuring smooth operation. Both the oil pump and the water pump, mounted at the rear of the bed, are driven by the same motor.

A plain wheel-feed mechanism is standard equipment, but a hydraulic

automatic wheel-feed mechanism or a straight in-feed mechanism can be furnished. Four work speeds are obtainable by changing the pulleys and belts at the left-hand end of the headstock. Three constant-speed motors are employed: ½ hp. for the headstock, 1 hp. for the pump, and 3 hp. for the wheel-spindle drive. The machine is offered in 6 x 18 and 6 x 30-in. sizes, weighing 3750 and 4000 lb. respectively, without electrical equipment.

## Hook-On Crane Bucket Uses Single Line

**T**HE hook-on or single-line clamshell bucket illustrated has been placed on the market by the Erie Steel Construction Co., Erie, Pa. It may be



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**I**NTENDED for a wide range of service, including material handling in foundries and steel mills, this bucket may be quickly attached to any crane.  
▼ ▼ ▼

attached quickly to the crane merely by placing the bucket yoke on the crane hook. Complete operation of the bucket is possible from the crane cab. Safety from accidental discharge of the load is provided by the design of the latching mechanism.

High closing power provides for efficient operation on various types of work. The closing line is reeved around snubber sheaves to eliminate serious opening shocks. Smooth opening is furthered by heavy bumper springs that contact the power arm when the bucket is fully open.

Ample reinforcement is provided. High-carbon steel lips extend to the hinges at the top of the scoops, and a back band extends entirely around the scoops to tie-in with the hinges. Drop-forged corner bars are attached to brackets riveted to the sides and backs of the scoops.

All moving parts are bronze bushed and lubricated by the Alemite system. The buckets are made in five sizes, from ½ to 1½ cu. yd. rated capacity, and weighing from 3400 to 4800 lb.



## A RAPID SURVEY OF THE WEEK'S EVENTS

### UP FIVE BILLIONS

**T**OTAL value of all of the securities listed on the New York Stock Exchange jumped nearly five billion dollars during the month of June. This was an average "appreciation" of 11.4 per cent over the values established at the end of the previous month.

The automobile and accessories group made a gain of 12.5 per cent in paper values; electrical equipment companies jumped 12.7 per cent; machinery and metals group gained 12.1 per cent, and the steel, iron and coke group took a 10 per cent rise.

Trade performance had little to do with this gain, for most of the groups represented are now encountering the seasonal downtrend in volumes. The gain in security prices was brought about almost wholly by improved public sentiment and returning confidence.

### SIGNPOSTS

**G**ENERAL MOTORS announces that it will advance its monthly statement of sales of motor cars in order that business may have this valuable barometer of buying trends at the earliest possible moment each month. Representing, as it does, a large cross-section of the industry, this report is a very helpful guide to manufacturers and merchants in all lines as to the general consumer's willingness to spend money.

The more signposts of this sort, the easier for business to find its way about. And while there may be more romance and excitement in exploring uncharted territory, the following of well-marked routes is more likely to get one to his destination.

### SWIMMING UP STREAM

**M**ACHINERY exports in May were the smallest in dollar volume of any month since February, 1925. But, in spite of this, industrial machinery, machine tools and mining machinery gained over those of April.

When the world prepares to go to work again, after its long vacation, its first demand is for wealth-creating tools.

### SENTIMENT

**B**IGGEST news of the week, of course, is the final agreement upon the Hoover moratorium plan. The public reaction to this has been such as to convince most of us that the worst may be over and that better times both at home and abroad are not far away.

Consistent upturn in commodity prices indicates that manufacturers should now prepare for both buying and selling. When the depression curtain finally goes up it may do so more quickly than we expect, and it will be well to have our stage set and the act well advertised in advance.

### EDUCATORS

**A** PROMINENT American engineer, doing considerable work in Russia, says that we are indirectly but effectively educating Europe in American methods and designs. American engineers plan the equipment and layout for Soviet plants, using the latest American technique. Then Russia, unable to purchase the equipment from us because of credit terms, has it built in Germany or elsewhere. And the builder profits both in experience and in sales volume.

It probably will be a long time before what we are doing in Russia will enable her to compete with us, but what we are indirectly doing for European competitors is "something else again."

### MODERNIZATION

**T**HE Committee on Recent Economic Changes has reported a survey of replacement policies in leading industries. No companies were found which would purchase equipment unless it promised to repay its cost within five years. Sixty-four per cent of the companies surveyed insisted on cost recovery in three years, while the remainder set a two-year limit.

A great many of our production tools have been sufficiently improved during the past few years to possess the power to "pay out" within the required limits. But cost reduction capability is but one reason for replacement. One must not overlook the additional appeal of a better functioning or more attractive and useful product. New equipment is sometimes a "good buy" even if it does not turn out the product faster.

### Also in This Issue

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Southern Railroads to Cancel Northern Rate Increases  
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Standardization in Russia  
British Steel Responds to Moratorium



# Pig Iron Imports Not Menace, Says the Tariff Commission

No Tendency Toward Increase in Foreign Receipts Since 1926—  
India Principal Shipper



WASHINGTON, July 7.—The detailed pig iron report of the Tariff Commission made to President Hoover shows that the weighted cost of Indian foundry iron laid down at the North Atlantic Seaboard was \$19.07 a gross ton during the 18-month period, Jan. 1, 1929-June 30, 1930. This was the period covered by the commission in its investigation under the flexible provision of the Hawley-Smoot Act to determine the differences in costs of production of "iron in pigs" in the United States and the principal competing country, India. The President approved the recommendation of the commission for no change at this time in the duty of \$1.12½ a ton.

The Indian cost was based on the invoice price plus expenses of delivery to the North Atlantic market. It is \$1.86 a ton under the delivered cost of \$20.93 at the North Atlantic market of foundry iron made in Eastern blast furnaces. It is \$4.77 under the delivered cost of \$23.84 for iron made in Buffalo districts, based on the actual charges paid, and \$3.40 less than the cost of \$22.47, based on an equalized rate.

The Indian iron competes principally with iron from the Eastern and Buffalo furnaces, and the foundry grade is the one mostly affected. The previous investigation of pig iron costs was made in 1924 and resulted in a proclamation by President Coolidge increasing the duty to its present rate from 75c. The differences in delivered costs of Eastern and Buffalo district and Indian foundry iron delivered at North Atlantic markets were shown in the former report to be between \$7 and \$8 a gross ton.

## Average Production Cost in United States Is Lower

The marked decrease in the cost differences shown by the present investigation is explained by the commission as follows:

A number of domestic plants with high costs which were in operation in 1924 and were included in the cost averages for that period are no longer operating, and an increased share of the production has been taken by low cost integrated plants.

There has been improvement in blast furnace practice, resulting in somewhat lower costs of production in the United States.

Materials for the domestic plants are lower in price than formerly.

In the present investigation, the inland freight charges on imported iron in pigs from ports of importation to the actual points of consumption in the North Atlantic areas have been included, whereas in the earlier investigation the foreign cost included only freight charges to the port of New York.

In addition to recommending no change in the duty, which was found to be equivalent to an ad valorem rate of 7.5 per cent during 1928-1930, the commission said it is not desirable at this time to fix a separate rate or rates of duty on basic and Bessemer iron and other classes, which are little, if at all, subject to foreign competition. This finding evidently grew out of the suggestion made at the hearing Oct. 30, 1930, by S. E. Walton of the Heppenstall Co., Pittsburgh, that charcoal or other iron he declared was not competitive with American iron be given separate classification at a lower rate of duty. The commission assigned as its reason for making no separation the difficulty of establishing definitions that will differentiate classes of pig iron so that they may be accurately distinguished by customs officials.

## Steel-Making Iron Is Little Affected by Duty

The report said that, although a reduction in the rate of duty on steel-making iron, which constitutes much the larger part of the domestic production, might be justified on the basis of cost differences, such a change would have practically no effect on the industry, either domestic or foreign.

The commission pointed to the average importation of "iron in pigs" during the 1927-1929 period as 140,339 tons, compared with domestic merchant production during that time of 8,570,000 tons, or 22 per cent of total domestic average yearly production of all kinds of pig iron, amounting to 38,000,000 tons.

"It is obvious from the low ratio of imports to domestic production that under the existing duty the great bulk of American pig iron production is being little affected by foreign competition," says the report.

The commission, however, recognizes that general totals do not ade-

quately analyze the situation and exhaustively goes into the situation as to production, costs, competition, and uses of the different grades in the four large producing areas. These areas are the Midwestern, embracing mainly plants in the territory between Pittsburgh and Chicago; the Alabama district, centering around Birmingham; the Buffalo district, centering around Buffalo, and the Eastern district, with furnaces in eastern Pennsylvania, eastern New York, New Jersey, and New England.

While the Midwestern district is the largest producer of foundry, as well as steel-making iron, and has a lower cost of production of foundry iron than the Buffalo or Eastern district, the commission says, it is pointed out that it is not able by reason of freight charges to compete with them nor with imported iron in the territory along the Atlantic Seaboard. For the same reason, it is stated, the Midwestern district is practically free from the competition of the Buffalo and Eastern districts, and also from the competition of imported iron, in its major markets lying west of the Allegheny Mountains and north of the Ohio River.

## Lowest Pig Iron Production Costs Are in Alabama

The lowest costs of production of foundry iron, the report says, are found in the Alabama district, and producers there are able, notwithstanding heavy freight charges, to sell some foundry iron, especially for making cast iron pipe, along the North Atlantic Seaboard, in competition with the producers of the Buffalo and Eastern districts and with imported iron. On the other hand it is stated that because of "a very considerable freight rate," imported iron cannot compete with Alabama iron in the Alabama district, except in small coastal markets.

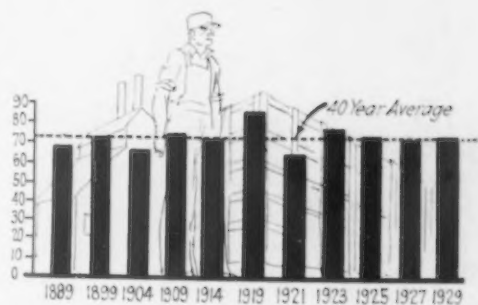
An entirely different situation as it relates to foreign competition exists with regard to Buffalo and Eastern furnaces, it is declared. The Buffalo district, the report points out, unable by reason of relatively higher production costs as well as by freight charges, to compete in Midwestern territory, is compelled to sell its product either locally or in territory toward the East. Somewhat more than

# HERE ARE SOME FACTS

**H**ERE are some facts that should be studied by every user and builder of improved machinery.

Take the first chart on this page, which shows, over a 40-year period, the number of wage earners employed in our manufacturing industries per thousand of our population.

Notice that the density of employment, as it may be termed,



Number of Wage Earners in United States Manufacturing Industries per Thousand of Population



Number of Paupers in United States Public Institutions per ten thousand of Population

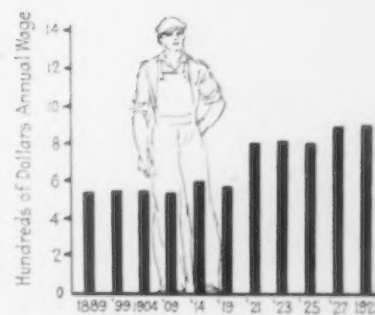
in our highly mechanized industries has not been diminished by 40 years of mechanization. The number employed in these industries in 1929 per thousand of our population exceeded, in fact, the average for the entire 40-year period. This means that improved machinery has *not* caused technological unemployment, even in our highly mechanized "manufacturing industries." And our figures do not show the enormous increase in service and other occupations that has resulted from increased output.

Now look at the little chart at the left. This shows the number of paupers in public institutions per ten thousand of our population. During 40 years of intensive mechanization, pauperism has been cut nearly in half. Does this

look as if mechanization were "grinding down the masses"?

And now examine the third and last chart on this page. It shows the growth of the average American pay envelope in manufacturing industries as measured in *real buying power*. Nominal dollar-wages have, of course, increased more rapidly.

Those who may be hesitating to adopt a policy of plant modernization and machine replacement, because of the fear that it may accentuate unemployment, should be reassured by a study of these facts. Improvement in mechanization does *not* dilute employment. It reduces poverty, builds real buying power, reestablishes lost profits.



Average Buying Power of Wages in United States Manufacturing Industries per Wage Earner

Copies of this insert may be secured from the Reader Service Dept. of The Iron Age, 239 West Thirty-ninth Street, New York.

Previous recent editorials in this series appeared in the following issues of THE IRON AGE: March 12, March 19, April 9, April 16, April 23, April 30, May 7, May 14, May 21, May 28, June 4, June 18, 1931.

By  
**JOHN H. VAN DEVENTER**  
Industrial Consultant  
The Iron Age





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"The cost of the foundry iron of the Buffalo district, including delivery to these seaboard markets, exceeds the corresponding costs of the imported product by much more than the amount of the existing duty," says the report. "On the other hand, at the present time practically no imported pig iron reaches either Buffalo itself or those parts of the State of New York which are more than 100 miles from the Atlantic Seaboard. At Buffalo itself, the imported iron, including delivery to that point, would cost more than the iron produced locally, and in a considerable part of the State of New York the difference in cost of production including delivery would not exceed the existing duty.

The producers of foundry pig iron in the Eastern district were declared to be less favorably situated as regards sources of raw material than those of the Midwestern and Alabama districts, and their costs of production are higher, largely on that account. It is stated that practically their entire product is marketed at or close to the North Atlantic Seaboard and is subject to the competition of the imported iron. In most markets in which these producers sell, the report says, the inland freight charges paid on imported pig iron are lower than those paid by the Eastern producers to the same markets.

"Since the cost of the imported product laid down at seaboard points is less than the cost of production at plants in the Eastern district," it is pointed out, "the total delivered cost of the imported iron is less than that of the domestic product of the Eastern district by an amount greater than the present duty."

#### Imports Have not Tended to Increase

The report says, however, that despite the advantage of the foreign producers in cost of production and delivery along the North Atlantic Seaboard, imports have not tended to increase during the period since 1926, and, in fact, are much lower than during the period 1923 to 1926. The total quantity of iron in pigs sold by producers of the Buffalo and Eastern districts in what may be considered North Atlantic Seaboard territory is placed at about 1,200,000 annually, and the imports into that territory at about 100,000 tons annually. It is declared that production in India is limited, and there is also a limit to the tonnage of iron which the regular steamship lines will accept at low rates as ballast.

Of total imports of 137,031 tons of pig iron in 1930, according to the report, 108,261 tons came from India. Of the total of 147,763 tons imported in 1929, India supplied 69,243 tons, of which 36 per cent entered through

the port of Philadelphia, 8 per cent through New York, 17 per cent through Massachusetts, 11 per cent through Maryland, or a total of 72 per cent entering the North Atlantic Seaboard. The only entry of Indian iron at a Gulf port was 917 tons at Galveston, a market supplied largely by Alabama iron. The average furnace cost of production of foundry iron in the Alabama district was

given as \$13.31, while the average cost of Alabama iron, based on actual charges made, is given as \$19.30, delivered at the North Atlantic Seaboard, and, based on an equalized rate, the cost is given as \$15.89, the former 23c. and the latter \$3.18 under the Indian cost. The Buffalo furnace cost is given as \$19.48, while the Eastern district furnace cost is given as \$18.92.

## Bethlehem Steel Corp'n. Changes Its Executive Bonus System

### Stockholders, Including Protesting Minority Interests, Vote for New Plan—Depreciation Comes Ahead of Payments

**S**TOCKHOLDERS of the Bethlehem Steel Corp'n., at an adjourned annual meeting on July 2, Newark, N. J., voted to change the executive bonus system as follows:

1. The executive officers (that is, the officers of the corporation and heads of departments having general control of matters affecting the corporation and its subsidiaries as a whole) are to receive definite normal salaries, which, in the case of each, shall be fixed by those of the directors of the corporation who shall not receive any bonus payments, acting as a committee.

2. The executive bonuses shall be based upon the consolidated net income of the corporation and its subsidiaries after deducting all fixed charges and depreciation and the annual dividends upon the outstanding preferred stock of the corporation excluding any shares thereof that may be held in its treasury. The term "depreciation" shall be deemed to include depletion and obsolescence. The rates and basis of depreciation shall be such as the auditors of the corporation (who shall be certified public accountants) shall approve, and the total annual amount of the depreciation shall be reported to, and be subject to the approval of, the board of directors. The chairman shall inform those of the directors who shall not be entitled to receive any bonus payments of the allocation of the total percentage among the various participants.

3. The aggregate percentage of such consolidated net income, after deducting all fixed charges, depreciation and such preferred dividends, which may be distributed in executive bonuses for any period shall be fixed by those of the directors of the corporation who shall not receive any bonus payments, acting as a committee, such aggregate percentage not to exceed 8 per cent for any year.

4. The minimum percentages which were a part of the system as originally adopted are abandoned and it is placed wholly in the discretion of the directors not receiving bonus payments to fix such aggregate percentage within the maximum above specified.

5. The total amount of executive bonus payments made for each year is to be reported to the stockholders in the annual report of the corporation for such year, as was done for the year 1930.

6. The executive bonus payments may be made annually or at such fixed in-

tervals during the year as shall be determined from time to time by the board of directors or the chairman of the board to be in the best interests of the corporation.

The by-laws of the corporation were amended to conform to these changes.

The changes were concurred in by minority groups of stockholders, who had taken court action to restrain the company from continuing to pay bonuses under the old system.

#### C. M. Schwab's Letter of Explanation

In a letter to stockholders, Charles M. Schwab, chairman of the board, said in part:

In my letter to you of March 2, 1931, and also at the meeting of the stockholders held on April 14, 1931, at which many of you were present, I explained at length the bonus system of the corporation, particularly that part of it which relates to the bonus payments to officers of the corporation and heads of departments having general control of matters affecting the corporation and its subsidiaries as a whole, which we generally refer to as the executive bonuses. I believe today, as I have always believed, that the system is sound and that it has been largely responsible for the success of the corporation.

Although the system has been in operation for many years and the payments of executive bonuses made under it since 1917, as reported to the stockholders in my letter to them of March 2, 1931, were approved by a large majority of the stockholders, criticisms of the system were made by a substantial number of stockholders, which have had careful consideration by the board of directors.

The chief criticism that has been made is that heretofore depreciation has not been deducted from the consolidated net income of the corporation in determining the basis upon which the executive bonuses have been calculated. At the meeting of the stockholders held on April 14, 1931, I stated at length why I believed that the system in this regard was right as it stood. In view of the criticisms of this feature of the system, however, the directors unanimously decided to recommend that the system be changed so as to provide that hereafter in determining such basis depreciation shall be deducted. I joined in the recommenda-



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tion. This change has now been approved by the stockholders.

One of the fundamental principles of the Bethlehem bonus system has been that the salaries of the executive officers were nominal. The change in the system with reference to the deduction of depreciation made it necessary in the opinion of the directors that the system be further changed so as to provide that definite normal salaries shall be paid to such officers. It is anticipated that under the new arrangement the total compensation to be paid to the executives, including both salaries and bonuses, will be substantially reduced.

Since the by-law covering the administration of the bonus system was adopted, the amounts of the executive bonus payments have been determined by me as chairman of the board. As you know, I have personally never shared in any bonus awards, desiring always to be in position where I could fix the executive bonuses free from any suggestions that I was in any way influenced by personal gain. I cannot overlook the fact, however, that since I sent to the stockholders my letter of March 2, 1931, a number of them have criticized me because, as they have stated, the amount of the executive bonuses the payment of which I have authorized has been unduly liberal. I do not believe that the amount has been too large, but I recognize that the views of others should be considered.

Moreover, the personal responsibilities which I have assumed and tried faithfully to discharge in the interests of all the stockholders have been heavy. In view of the criticisms of the stockholders to which I have referred, I feel that these responsibilities should be shared with me by the other directors of the corporation, who shall not be entitled to participate in bonus payments and who, therefore, like me, are free from the charge of self-interest. I, therefore, recommended that the system be changed so that the total percentage of the executive bonuses that shall be paid in any year will be determined by such non-participating directors or by a majority of them. This recommendation has been adopted by the board and by the stockholders, and the by-law has been amended accordingly. It has been thought desirable to state hereafter in the regular annual report to stockholders the amount of the bonus payments for the preceding year, as was done in the 1930 report.

The changes in the bonus system which have been adopted were prepared after consultation with counsel for the plaintiffs in the suit in New Jersey involving the bonus system and with the protective committee for stockholders of the corporation, and at the stockholders' meeting held yesterday such plaintiffs and committee voted the stock which they owned or represented for the approval of such changes and for the amendment of the by-law.

## Galvanized Sheets to Bear Quality Seal

A "seal of quality," to be stenciled on galvanized sheets carrying specified weights of zinc coating, has been adopted by the American Zinc Institute, Inc., 60 East Forty-second Street, New York. This seal will be used by manufacturers of galvanized sheets under a license arrangement, to indicate sheets of certified quality. A statement by the zinc institute says:

"Extensive studies by the zinc institute and various technical organizations have shown that the dominant factor in determining the service of a galvanized sheet, from the standpoint of continued freedom from rust, is the thickness or weight of the zinc coating. This is customarily expressed in ounces per square foot, meaning thereby the total amount of zinc on both sides of the sheet; for instance, a 2-oz. coating means approximately 1 oz. per sq. ft. on each side. A heavier zinc coating will naturally give longer life; in fact, a relatively small increase in the coating will result in a very substantial increase in life.

"These facts have been well established, but curiously enough they have not been explained in any way to a large section of the consuming trade. A great deal has been said about the nature of the base metal used for galvanized sheets, which may be Bessemer or open-hearth steel, copper-bearing steel, pure iron, copper iron, wrought iron, etc.; and the relative rates of corrosion (or rusting) of these materials when exposed in an uncoated state have been fairly well

brought out by numerous tests. A galvanized sheet, however, is a sheet of one of these materials coated with zinc to protect it from rust, and the degree of this protection is dependent primarily upon the weight of the zinc coating.

"A sheet of any one of the various base materials, if insufficiently coated, will begin to rust and turn brown in a short time, the difference between the various materials being that the more rust-resistant will then last longer before the sheet rusts clear through. Regardless of what material is used, however, if it is desired to secure freedom from rust and the consequent need of painting over a long period of time, it is essential to use sheets carrying a sufficiently heavy coating of zinc.

Because of the variation in the zinc coatings on commercial galvanized sheets today, and the lack of any means whereby the consumer may identify an adequately coated product, the 'Zinc Institute Seal of Quality' has been suggested by both producing and consuming interests. Sheets bearing this seal will carry weights of zinc coating which were decided upon after careful field studies as being the most suitable for the service desired.

"For use in rural communities, particularly for roofing and siding of farm buildings, such sheets will be produced in No. 28 and 26 gage, with a coating of 1.75 oz. of zinc per sq. ft. This coating is fully 40 to 100 per cent heavier than coatings on most of the commercial sheets produced today, and will preserve the sheets from rust for a far longer period than the thinner coatings. For

use in localities where atmospheric conditions are more severe, sheets of 26 gage and heavier, carrying 2 to 2.50 oz. of zinc per sq. ft., will be produced.

"These heavily coated sheets will be sold mainly in the corrugated and V-crimp types, for use in roofing, siding and similar applications. Such sheets should not be subjected to severe bending or extreme forming operations unless special measures prevent damage to the coating.

"Application has been filed by the zinc institute with the United States Patent Office for registration of the seal, and its use will be limited to sheets produced under license, subject to careful checkings as to the standard of zinc coating. The matter has been submitted to all of the manufacturers of galvanized sheets and the right to use the institute's trade-mark is available to each of them without charge. License arrangements are now being concluded with a number of the manufacturers."

## Steel Castings Business Declined in May

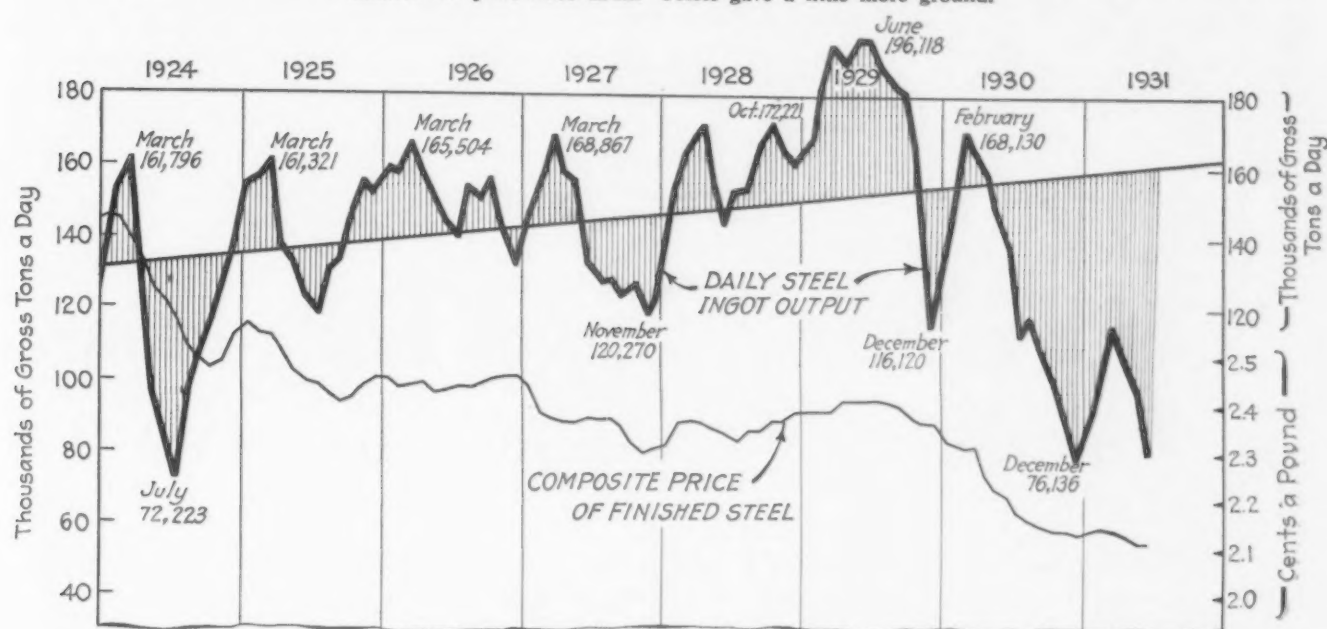
The May report of the Steel Founders' Society of America, Graybar Building, New York, reflects a downward trend in operations and bookings in that month. As compared with April, there was an increase of 6.1 per cent in the number of foundries reporting operations below 50 per cent, and an increase of 11.3 per cent in the number of foundries reporting bookings of below 50 per cent capacity.

The report, which is based on returns from 72 member foundries, shows that production in May was 34.6 per cent of rated normal capacity, and bookings were 29.9 per cent, both of these figures showing a decline from those of April. In May, 1930, production was 79.2 per cent of capacity, and bookings were 67.3 per cent.

## Scrap Dealers Oppose Freight Rate Drives

A resolution of protest against the proposed 15 per cent increase in freight rates was adopted on June 25 by the Pacific Coast chapter of the Institute of Scrap Iron and Steel, Inc. It was stated that freight rates on scrap are too high at present and prevent the free accumulation and movement of this material. Moreover, it was said that an increase in freight rates on scrap would prevent the gathering of many items, and therefore reduce the available supply for steel mills, foundries and other consumers. The resolution requested the national office of the institute to file formal protest with the Interstate Commerce Commission.

Ingot output in June showed a further decline of 17 per cent after May had dropped 8 per cent from April. The total was the smallest for June since 1921. Prices gave a little more ground.



## Steel Ingot Production Down 17 Per Cent from May

CONTINUING the decline begun in April, steel ingot production in June, as reported by the American Iron and Steel Institute, is 17 per cent below that for May, following a drop of 8 per cent in May from the April tonnage and 9 per cent in April from the March tonnage. The figures include open-hearth and Bessemer ingots only.

Production of these classes of in-

gots in June is calculated by the institute at 2,075,910 gross tons, the smallest total since that of last December, when 1,979,547 tons was made, and a sharp decline from the May total of 2,505,485 tons.

Each of the last four months has had 26 working days. The decline in production on the daily basis has been from 115,139 tons in March to 79,843 tons in June. This makes the smallest

June daily average since that of 1921, and, with the exception of last December, the smallest for any month since July, 1924, when production was at the rate of 72,223 tons a day.

### Half-Year Total Off 35 Per Cent

Production in the six months is calculated at 15,258,519 tons. This represents a drop of 35 per cent from the 23,578,610 tons produced in the first half of 1930. It is the smallest first-half total since that of 1922.

Bessemer and open-hearth tonnage declined about in proportion during the month, the drop in Bessemer having been slightly more than 18 per cent, and in open-hearth about 17 per cent. Compared with a year ago, the first six months shows a drop in Bessemer of 39 per cent and a drop in open-hearth of 35 per cent.

These figures do not include electrical or crucible steel. About 0.8 per cent should be added to the tonnage figures given to allow for these grades, in determining the total steel ingot output of the country.

On the basis of estimated capacity as of Dec. 31 last, production in June is given by the institute at 37.58 per cent, compared with 45.36 per cent in May. For the six months the average has been 46.34 per cent. This compares with 75.98 per cent in the first half of 1930, while June of that year showed 68.30 per cent, both these latter figures being based on estimated capacity at end of 1929.

PRODUCTION OF OPEN-HEARTH AND BESSEMER STEEL INGOTS  
(Gross Tons)

	Reported by Companies Which Made 95.21 Per Cent of the 1930 Ingots		Calculated Output of All Companies		No. of Working Days
	Open-Hearth	Bessemer	Monthly	Daily	
Total, 1929..... 1930	44,101,321	7,091,680	54,312,279	174,639	311
January .....	3,157,761	441,572	3,778,235	139,935	27
February .....	3,335,428	508,618	4,035,111	168,130	24
March .....	3,513,269	539,616	4,254,331	163,628	26
April .....	3,405,671	509,234	4,109,492	158,057	26
May .....	3,265,353	528,968	3,982,915	147,515	27
June .....	2,849,079	407,586	3,418,535	136,739	25
Six months.....	19,526,561	2,935,594	23,578,619	152,120	155
July .....	2,430,128	353,723	2,922,220	112,393	26
August .....	2,541,367	374,467	3,060,763	117,722	26
September .....	2,275,910	429,975	2,840,379	109,245	26
October .....	2,165,341	399,704	2,692,539	99,724	27
November .....	1,807,133	300,339	2,212,220	88,489	25
December .....	1,659,026	226,786	1,979,547	76,136	26
Total, 1930..... 1931	32,405,466	5,020,588	39,286,287	126,322	311
January .....	2,044,298	296,620	2,458,689	91,063	27
February .....	2,085,529	296,972	2,502,366	104,265	24
March .....	2,504,060	346,139	2,993,590	115,139	26
April .....	2,275,404	316,668	2,722,479	104,711	26
May .....	2,083,833	301,639	2,505,485	96,365	26
June .....	1,730,109	246,365	2,075,910	79,843	26
Six months.....	12,723,233	1,804,403	15,258,519	98,442	155



## OFF THE ASSEMBLY LINE



# July and August Certain to Be Lean Months for Automobile Industry

DETROIT, July 6.

**T**HE downward trend of automobile production, which began in May and became more pronounced in June, continued more precipitately the past week, with indications that output this month will fall to the lowest point since January. Although no figures are yet available for the entire industry, it would not be surprising if assemblies last month in the United States and Canada did not exceed 260,000 units, with a possibility that the 270,000 mark might have been reached.

July operations are difficult to gage on account of the imminence of plant shutdowns, some of which may come before the month is ended. However, it seems likely that curtailments already put into effect or scheduled for the immediate future will pare down output to 200,000 to 220,000 units, compared with the year's peak of 352,867 units attained in April and the low mark of 178,347 units in January. Last year production in July was 275,721 cars. Thus, the industry is facing the poorest July in a decade.

Suspension of manufacturing activities by numerous companies, including the largest maker, for inventory purposes the latter part of July or the early part of August is almost sure to put August among the leanest months of the year, so that the climb from the low midsummer level is not expected to get under way until September. The industry feels, however, that it is now entering its leanest season and that when it emerges in the early fall there will be a steady upward movement in output, with little chance of a repetition of last year's experience in the final quarter, when production sunk to depths executives had scarcely believed possible.

### Chevrolet Still Leading in Passenger Car Sales

**W**HILE this description of the current state of affairs in automobile circles appears somber, there are individual performances which

are not pessimistic about the immediate outlook and are counting on producing a substantial volume of cars during the third quarter.

Auburn turned out 3205 cars in June, against 6717 in May and only 950 in June, 1930. In the second quarter it made 18,369 cars, compared with 6450 last year and 8530 in 1929. During the first half of this year Auburn manufactured 27,660 cars, or double the number in the entire year 1930 and 5193 more than in the previous peak year of 1929. Buick produced 6479 cars in June, compared with 4135 in the corresponding month last year. Nash assembled 6815 cars of its new series in June and hopes to duplicate this figure this month. Reo made 1739 cars in June, bettering its record in the same month of 1930. Hupmobile's output last month declined to 1631 cars from 2154 cars in May. Hudson's total is not available, but it is known that its activities have been sharply curtailed in recent weeks.

The June output of the Ford Motor Co. has not been announced, but the trade believes that it was around 85,000 cars, compared with 102,000 in May. July is likely to bring a further production decline. On account of the acceleration of Plymouth assemblies, Chrysler's performance in June is thought to have been better than in May and should be fairly well sustained during the current month.

**New Plymouth Car Revealed**

**Y**ESTERDAY the much-discussed Plymouth was revealed to the public, featuring "floating power," free wheeling and easy shifting gears. The Chrysler merchandising organization is heralding "floating power" as the fourth milestone of automotive engineering, claiming that it is a contribution which ranks in importance with the self-starter, four-wheel brakes and the all-steel body. Vibration from the four-cylinder engine is eliminated by floating the power plant in the chassis on two rubber engine mountings. The rear mounting is lo-



cated in the cross member at the rear of the transmission, the front one is just under the water pump and is supported on a specially constructed triangular bracket attached to the front cross member. A line connecting the rear and front mounting points would pass through the center of gravity of the power plant. To preserve the proper alinement of the engine and to hold the engine's movement within the limits allowed by the rubber mountings, a built-up cantilever spring is used between the rear of the engine and the frame side member. The built-up end of the spring is attached rigidly to the engine and the other end is embedded in rubber in the frame side member. The power plant thus rocks freely on its natural axis and vibrations normally transmitted to frame and body are dissipated.

Free wheeling is controlled by a button on the instrument panel and may be locked out by pulling out the dash control. An "easy-shift" transmission of the constant-mesh type has been developed. Other features incorporated in the Plymouth have been copied from other Chrysler-made cars: all-steel bodies, double-drop frames and internal hydraulic brakes. The car has an overall length of 169 3/16 in. and an overall height of 67 in. Piston displacement of the four-cylinder engine is 196.1 cu. in. Explaining its development of a vibrationless four, the Plymouth company states, "while cylinders have been added and the industry has sponsored sixes, eights and other multi-cylindered engines, Plymouth engineers have worked unceasingly for a perfected four. They realized that the four is the most economical, simplest and most practical of all gas engines. They also know that it is sturdier, longer lived, easier and cheaper to maintain, just as speedy, as quick on the pick-up and as dogged on the hills or in sand as any car of equal power efficiency. It has been accepted as the ideal car at the lowest price."

The new Plymouth is offered in eight body styles and is priced at \$535 to \$645, which is well within the lowest price field. It is no secret that the Chrysler people are counting on the new car to provide them a firm footing in the class heretofore dominated by Ford and Chevrolet. If Chrysler could make the Plymouth a fast-selling car, its position as the third largest automobile manufacturer would be materially strengthened. If the new Plymouth is the success that Chrysler believes it will be, it is apparent that Ford's problem of meeting competition in the model A price range, already severe due to Chevrolet's challenge, will be further intensified.

#### Willys-Overland to Make New Knight Line

IT is reported that the Willys-Overland company will introduce a new Knight line of cars to sell at \$845 to

\$895, f.o.b. factory. This is considerably lower than the Knight has previously brought. All Willys-Overland cars now have free wheeling as optional equipment at extra cost. The rapidity with which free wheeling has spread in the industry is shown by the number of this year's converts, either in the form of standard or optional equipment—Auburn, Marmon, Hupmobile, Lincoln, Graham-Paige, Hudson-Essex, Plymouth, Peerless and Willys-Overland. It was originally introduced by Studebaker less than a year ago.

One of the largest manufacturers of medium-priced cars has adopted the recently developed Parkelite process of rust-proofing and binding paint and enamel to automobile bodies by the spray-gun method. The process, patented by the Parker Rust-Proof Co., Detroit, is said to add materially to the quality of the body finish and to accomplish economies in body manufacturing costs.

The record-breaking hot weather of

the past week interfered considerably with automobile production, the temperature at times reaching such heights that entire departments had to be closed. Because of the reduced melt due to the torrid weather, the Chevrolet gray iron foundry at Saginaw operated four days instead of three in order to meet requirements for castings.

ON account of the recent decline in open-hearth furnace operations, with a corresponding decline in demand for hot metal, the Hanna Furnace Corp. has blown out its second blast furnace at Zug Island. This furnace operated only a short time after being idle for many months.

In a temporary financial dilemma, the city of Detroit has turned to its largest industry to help it out of its difficulties. The Ford Motor Co. has loaned the city \$5,000,000 at 3 1/2 per cent interest until Sept. 15, with an opportunity of further financial assistance, if necessary, at the expiration date.

## Steel Barrel Production Made Gain in May

WASHINGTON, July 2.—Making a gain of 19,389, the production of steel barrels in May totaled 610,788, or 43.1 per cent of capacity, compared with 591,399, or 41.9 per cent, in April, according to reports received by the Bureau of the Census from 27 establishments. Shipments increased to 618,801 from 600,566 and stocks at the end of May declined to 42,315 from 50,328 at the end of April.

Unfilled orders at the end of May amounted to 1,052,641, against 1,195,128 at the end of April. Unfilled orders at the end of May for delivery within 30 days totaled 248,138, compared with 253,622 at the end of April, while unfilled orders at the end of May for delivery beyond 30 days totaled 804,503, against 941,506 at the end of April.

## To Demonstrate New Milling Equipment

A three-day demonstration of new milling machines — manufacturing, plain, universal and sliding-head vertical types—featuring unusual speed, power and versatility, will be held by the Kearny & Trecker Corp., Milwaukee, on July 15, 16 and 17. Tungsten - carbide cutters will be shown on production type machines, and tungsten and tantalum-carbide cutters on new knee-type millers.

Some of the machines will be operated at spindle speeds up to 1500 r.p.m., and step-cut milling will be demonstrated on the company's new

sliding-head vertical. A hypoid gear dividing head, said to be constructed on an entirely new principle, divides all numbers up to 500 and will cut more than 40,000 leads, and a thread milling attachment that permits milling tapered thread on a standard tool-room miller will be among other new devices shown. There will be 38 exhibits in all, grouped at eight different stations. Radio loudspeakers, ample seating capacity and a cooling system are among arrangements intended to assure comfort for visitors.

## Bar Iron Rate Unchanged

The wage rate on bar iron will remain unchanged for July and August, as based on a 1.70c. card, according to an agreement reached between the Western Bar Iron Association and the Amalgamated Association of Iron, Steel and Tin Workers. The rate is based on the average selling price of bars in the May-June period and entitled puddlers to a wage rate of \$10.30 a ton.

Orders for steel furniture in the "business group" were valued at \$1,332,693 in May, against \$1,436,899 in April, according to reports received by the Bureau of the Census from 34 manufacturers. Orders for shelving furniture rose to a value of \$471,416 from \$369,878, according to reports from 16 companies.

American Zinc Products Co., Greencastle, Ind., has removed its New York office to the Empire State Building, 350 Fifth Avenue.

# Pig Iron Production at Low Point of Year— Net Loss of 14 Furnaces

**B**LAST furnaces were blown out during June in greater numbers than for many months. The toll was 17 put out and three blown in, representing a net loss of 14 and bringing the active stacks to 91, compared with 105 on June 1. The number in blast July 1 was the lowest since Oct. 1, 1921, when 82 stacks were making iron.

Coke pig iron production in June was 1,638,627 gross tons, a decline of 18 per cent from the 1,994,082 tons in the 31 days of May. The total was the smallest for June since 1921, and represented a shrinkage of about 36 per cent from last year. It was lower

than the aggregate of last December, but on account of the smaller number of days represented a slightly higher daily average output. In the aggregate, the June output was the lowest for any month since February, 1922.

On the daily basis, production was at the rate of 54,621 tons—almost 10,000 tons below the 64,325 tons of May. This compares with 53,732 tons last December, the smallest figure since that of January, 1922.

In six months the total production has amounted to 11,105,473 tons. This shows a drop of more than 7,000,000 tons, or approximately 39 per cent,

from the output in the first half of 1930, and is only slightly greater than half the total in the first half of 1929. The output during the first half was the smallest for that period since 1921, when only 9,428,166 tons was made. It is actually at a smaller percentage of capacity than was the case at that time, owing to the much greater present total capacity of our producing furnaces.

## Net Loss of 14 Furnaces

**S**EVENTEEN furnaces were blown out during June and only three were blown in. This leaves 91 active stacks on July 1 against 105 on June

Daily Average Production of Coke Pig Iron in the United States  
by Months—Gross Tons

	1927	1928	1929	1930	1931
Jan. ....	100,123	92,573	111,044	91,209	55,299
Feb. ....	105,024	100,004	114,507	101,390	60,950
March ....	112,366	103,215	119,822	104,715	65,556
April ....	114,074	106,183	122,087	106,062	67,317
May ....	109,385	105,931	125,745	104,283	64,325
June ....	102,988	102,733	123,908	97,804	54,621
½ year...	107,351	101,763	119,564	100,891	.....
July ....	95,199	99,091	122,100	85,146	.....
Aug. ....	95,073	101,180	121,151	81,417	.....
Sept. ....	92,498	102,077	116,585	75,890	.....
Oct. ....	89,810	108,832	115,745	69,831	.....
Nov. ....	88,279	110,084	106,047	62,237	.....
Dec. ....	86,960	108,705	91,513	53,732	.....
Year ...	99,266	103,382	115,851	86,025	.....

Pig Iron Production by Districts, Gross Tons

	June (30 days)	May (31 days)	April (30 days)	March (31 days)
New York and Mass....	88,537	105,104	95,375	100,660
Lehigh Valley .....	46,743	38,745	43,613	47,293
Schuylkill Valley.....	27,167	27,936	25,665	29,390
Lower Susq. and Leba- non Valley .....	8,142	18,956	18,652	19,187
Pittsburgh district....	339,018	441,653	431,116	427,034
Shenango Valley .....	28,543	55,835	53,893	46,476
Western Pennsylvania..	32,519	32,430	55,632	56,354
Maryland, Va. and Ky..	66,589	77,218	78,442	85,148
Wheeling district .....	117,309	119,310	110,415	98,348
Mahoning Valley .....	151,870	172,703	175,963	176,262
Central and North'n Ohio	133,525	185,095	194,453	198,855
Southern Ohio .....	22,573	23,885	26,460	32,230
Illinois and Indiana....	317,488	405,511	445,669	453,241
Mich., Minn., Mo., Wis., Colo. and Utah.....	79,608	96,256	77,427	86,972
Alabama .....	178,996	193,445	186,534	172,982
Tennessee .....	.....	.....	220	1,816
Total .....	1,638,627	1,994,082	2,019,529	2,032,248

Daily Rate of Pig Iron Production by Months—Gross Tons

	Steel Works Iron	Merchant Iron*	Total
June, 1930.....	77,883	19,921	97,804
July .....	66,949	18,197	85,146
August .....	64,857	16,560	81,417
September .....	62,342	13,548	75,890
October .....	57,788	12,043	69,831
November .....	49,730	12,507	62,237
December .....	40,952	12,780	53,732
January, 1931.....	45,883	9,416	55,299
February .....	49,618	11,332	60,950
March .....	54,075	11,481	65,556
April .....	53,878	13,439	67,317
May .....	51,113	13,212	64,325
June .....	43,412	11,209	54,621

\*Includes pig iron made for the market by steel companies.

Coke Furnaces in Blast

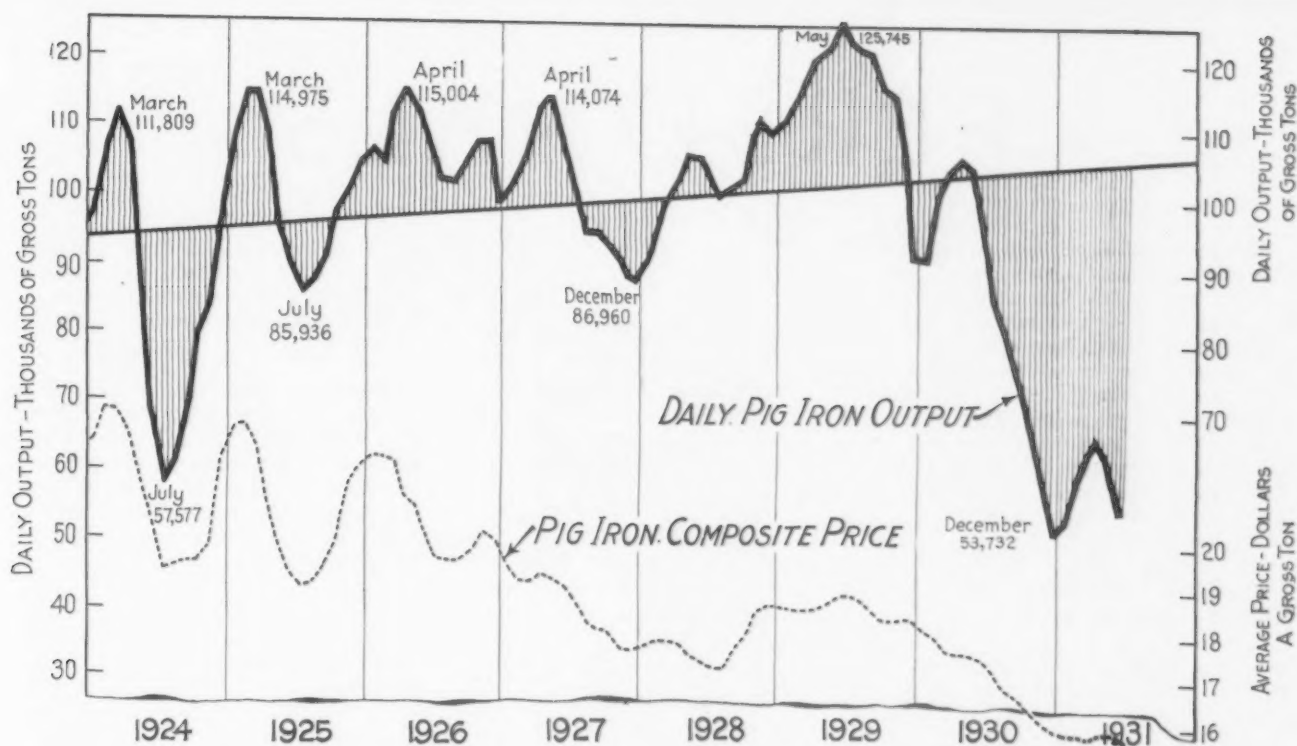
	July 1		June 1	
	Number in Blast	Rate of Operation	Number in Blast	Rate of Operation
New York:				
Buffalo .....	4	2,340	4	2,580
Other N. Y. and Mass.	2	880	2	800
New Jersey.....	0	.....	0	.....
Pennsylvania:				
Lehigh Valley .....	4	1,560*	4	1,250*
Schuylkill Valley....	2	905	2	900
Susquehanna Valley..	1	270	1	610
Ferromanganese .....	0	.....	0	.....
Lebanon Valley.....	0	.....	0	.....
Pittsburgh District...	16	10,930	18	12,035
Ferro. and Spiegel..	1	150	1	135
Shenango Valley.....	1	490	3	1,800
Western Pennsylvania	2	1,080	1	635
Ferromanganese .....	0	.....	2	410
Maryland .....	3	1,800	3	2,015
Wheeling District.....	5	3,910	5	3,850
Ohio:				
Mahoning Valley.....	8	4,465	10	6,050
Central and Northern	8	4,150	9	5,280
Southern .....	3	830	2	770
Illinois and Indiana....	13	8,500	17	12,075
Mich., Wis. and Mian...	3	1,510	4	1,970
Colo., Mo. and Utah....	2	870	3	1,225
The South:				
Virginia .....	0	.....	0	.....
Ferromanganese .....	0	.....	0	.....
Kentucky .....	1	415	1	455
Alabama .....	12	5,800	13	6,240
Ferro. and Spiegel..	0	.....	0	.....
Tennessee .....	0	.....	0	.....
Total .....	91	50,855	105	61,085

\*Includes spiegeleisen.

Production of Coke Pig Iron in United States by Months  
Gross Tons

	1929	1930	1931
January .....	3,444,370	2,827,464	1,714,266
February .....	3,206,185	2,838,920	1,706,621
March .....	3,714,473	3,246,171	2,032,248
April .....	3,662,625	3,181,868	2,019,529
May .....	3,898,082	3,232,760	1,994,082
June .....	3,717,225	2,934,129	1,638,627
½ year.....	21,640,960	18,261,312	11,105,373
July .....	3,785,120	2,639,537	.....
August .....	3,755,680	2,523,921	.....
September .....	3,497,564	2,276,770	.....
October .....	3,588,118	2,164,768	.....
November .....	3,181,411	1,867,107	.....
December .....	2,836,916	1,665,690	.....
Year* .....	42,285,769	31,399,105	.....

\*These totals do not include charcoal pig iron. The 1930 production of this iron was 96,580 gross tons.



Daily production of pig iron remains further below theoretical needs than in 1924

Inclined line represents the gradually increasing requirements of the country, ascertained by balancing the ups and downs in production. It shows an average increase in consumption of about 575,000 tons yearly.

1, and brings us back to four stacks less than the 95 active at the beginning of the year. Furnaces in blast July 1 are estimated to have been making iron on that date at the daily rate of 50,855 tons. This contrasts with 61,085 tons a day for the 105 furnaces active on June 1.

Some districts held up in June much better than did others. The Wheeling district, for instance, lost only 2000 tons for the whole month, or less than 2 per cent. In Alabama the loss was about 14,500 tons, or 7½ per cent. Southern Ohio held up within about 6 per cent of May. Western Pennsylvania actually exceeded the May output by almost 100 tons and the Schuylkill Valley held within 3 per cent of

May. Lehigh Valley went above May about 8000 tons, making the largest output since last March.

Against these are recorded losses of more than 100,000 tons, or 23 per cent, in the Pittsburgh district, almost 50 per cent in the Shenango Valley, more than 50,000 tons, or almost 30 per cent, in central and northern Ohio, and 88,000 tons, or 32 per cent, in Illinois and Indiana. The two largest districts in the country suffered heavy losses.

#### Furnace Changes in June

ONLY three furnaces were blown in in June—one being a Susquehanna stack of the Hanna Furnace Co. in the Buffalo district, another the F

furnace of the Cambria plant of the Bethlehem Steel Co. in western Pennsylvania. In addition, the Jisco furnace of the Jackson Iron & Steel Co., in southern Ohio, was taken off the bank.

Furnaces blown out included F of the Lackawanna plant of the Bethlehem Steel Co. in the Buffalo district; No. 3 and No. 4 in the Duquesne plant of the Carnegie Steel Co.; H and K of the Bethlehem Cambria plant; No. 2 of the Haselton plant of the Republic Steel Corp., and D furnace in the Campbell plant of the Youngstown Sheet & Tube Co., both in the Mahoning Valley; No. 2 in the Newcastle plant of the Carnegie Steel Co., and one Shenango furnace, in the Shenango Valley, Pa.; No. 5 in the National Tube Co. plant in northern Ohio; No. 4 in the Joliet plant, No. 2 and E in the South Chicago plant of the Illinois Steel Co., and No. 3 in the Gary plant of the same company, all of these being in the Chicago district; one Detroit (Zug) furnace in Michigan, one furnace of the Colorado Fuel & Iron Co. at Pueblo, and the Gulf States Steel Co. stack at Alabama City, Ala.

As a result of these changes in furnaces in blast, the United States Steel Corp. has eight furnaces fewer in operation than a month ago, independent steel companies have lost six stacks, while merchant stacks show a loss of two offset by a gain of the same number.

Production of Steel Companies for Own Use—Gross Tons

	Total Pig Iron Spiegel and Ferromanganese			Ferromanganese*		
	1929	1930	1931	1929	1930	1931
Jan. ....	2,651,416	2,214,875	1,422,382	28,208	27,260	14,251
Feb. ....	2,498,901	2,284,234	1,389,304	25,978	21,310	19,480
March ....	2,959,295	2,600,980	1,676,316	24,978	23,345	27,899
April ....	2,826,028	2,564,681	1,615,375	22,413	27,777	25,456
May ....	3,105,404	2,613,628	1,584,511	25,896	30,296	23,959
June ....	2,999,798	2,304,223	1,302,345	33,363	27,327	11,243
½ year....	17,040,842	14,582,621	8,990,233	160,836	157,325	122,288
July ....	3,039,370	2,075,414	.....	31,040	17,728	.....
Aug. ....	3,065,874	2,010,572	.....	28,461	20,909	.....
Sept. ....	2,862,799	1,870,269	.....	27,505	21,181	.....
Oct. ....	2,902,960	1,791,421	.....	31,108	24,480	.....
Nov. ....	2,498,291	1,491,927	.....	31,866	18,619	.....
Dec. ....	2,112,704	1,269,529	.....	28,564	16,288	.....
Year .....	33,522,840	25,101,753	.....	339,380	276,530	.....

\*Includes output of merchant furnaces.



# PERSONALS

HAROLD H. CLARK has retired as vice-president and assistant secretary of the Pacific Division of Link-Belt Co., Chicago. He was with the company for 30 years. Soon after he was graduated from Cornell University in 1900, he joined the Link-Belt organization at Chicago, his first duties having been in the drafting room. RALPH M. HOFFMAN, for eight years manager of the Seattle office of the Pacific Division of Link-Belt Co., Chicago, has been appointed vice-president and sales manager of that division, with headquarters at San Francisco. He succeeds Mr. Clark.

EUGENE C. CLARKE has been elected president of the Chambersburg Engineering Co., Chambersburg, Pa., succeeding WILLIAM HERBERT DERBYSHIRE, JR., who has become chairman of the board. ARTHUR G. DICKSON has been made vice-president.

WILLIAM P. KIRK, vice-president in charge of sales of the Pratt & Whitney Co., Hartford, Conn., last week completed 25 years of service with the company and was presented with the 25-year gold service button by President CLAYTON R. BURT. In 1925 Mr. Kirk took over the general sales managership of the company and during his career has had wide experience in all phases of machine tool selling.

M. J. KEARINS, formerly associated with the Whitman Barnes-Detroit Corp., Detroit, has become president and general manager, with headquarters at Latrobe, Pa., of the combined Latrobe Tool Co. and the J. M. Carpenter Tap & Die Co.

NICHOLAS GERTEN, heretofore vice-president of the Blaw-Knox International Corp., New York, has been elected president. He joined the company in January, 1928, as sales manager. Mr. GERTEN was formerly an engineer in the technical department of the Mitsubishi Co., New York, and prior to that was with the Allied Machinery Co.

AUBREY J. GRINDLE, pulverized fuel engineer, has been placed in charge of the newly organized pulverized fuel department of the Beardsley & Piper Co., Chicago. He will have complete charge of engineering, manufacture and sale of pulverized fuel systems.

E. A. THUMLERT, formerly identified with the Palmer Bee Co., Detroit,



H. H. CLARK



R. M. HOFFMAN

has joined the sales organization of the Fairfield Engineering Co., Marion, Ohio, where he will specialize in the design and sale of skip hoists for handling coal and ashes, as well as ash hoppers and gates.

HENRY F. MILLER has been made manager of industrial sales for Goulds Pumps, Inc., Seneca Falls, N. Y., and W. G. ALLEN, manager of engineering sales. J. B. ANDERSON has been placed in charge of the inquiry and estimate department, and G. W. CRAMER has become advertising manager. MARK D. ROWE, formerly Eastern manager, Servel Sales, Inc., has been appointed manager of the New York office, J. B. FOLEY, formerly manager of the Pittsburgh office, is now manager of the Chicago office, and FRED JONES, of the Philadelphia office, succeeds Mr.

Foley as manager of the Pittsburgh office. FRED HAYES has been placed in charge of the newly-opened office in the Magnolia Building, Dallas, Tex.

EUGENE KELLER, JR., until recently district manager of the Philip Carey Co., Memphis, Tenn., has been appointed regional manager in the South and Southwest for the Armco Culvert Manufacturers Association, Middletown, Ohio. For the present he will make his headquarters in Nashville, Tenn.

C. N. JOHNS has been appointed general manager, with headquarters at Monessen, Pa., of the Page Steel & Wire Co., Bridgeport, Conn. W. H. BLEECKER, JR., has become sales manager, with offices at 701 American Bank Building, Pittsburgh.

O. P. WILLIAMS, for many years identified with the foundry trade in the Philadelphia district, has become sales representative for Carson, Marshall & Co., Philadelphia, dealers in pig iron, coke and coal.

AMBROSE SWASEY, chairman of the board of the Warner & Swasey Co., Cleveland, and LILLIAN M. GILBRETH, president, Gilbreth, Inc., Montclair, N. J., received the honorary degree of Doctor of Science at the commencement exercises of Brown University on June 15.

E. S. LACHMANN, formerly vice-president and a director of the Danville Structural Steel Co., Inc., Danville, Pa., which was acquired last year by the Bethlehem Steel Corp., sailed July 8 on an extensive tour through Europe.

H. A. TRUSLOW, vice-president, Armstrong Cork Co., Pittsburgh, has been made vice-president and treasurer, filling the vacancy of treasurer left by the recent death of William H. Larimer.

RICHARD L. BINDER, president, Metals Coating Co. of America, Philadelphia, was scheduled to sail on the Europa on July 7 for a business trip to Europe. He plans to establish contact with important developments abroad and to gain first-hand knowledge of the opportunities afforded by Germany in view of the economic adjustment now under way. Mr. Binder, while abroad, will visit the company's plants in Hamburg and Berlin. He will be accompanied by DR. LEOPOLD

PESEL, chemist and metallurgist of the company.

♦ ♦ ♦

LESLIE ALLEN, formerly manager of the Buffalo district for McClintic-Marshall Corp., has been appointed district manager at Pittsburgh, succeeding the late Thomas L. Cannon. J. K. BARD has been appointed manager of works of the Buffalo district.

♦ ♦ ♦

GEORGE T. LADD, president, United Engineering & Foundry Co., Pittsburgh, has been elected a director of the First National Bank at Pittsburgh.

♦ ♦ ♦

CHARLES F. BARTH, vice-president and general manufacturing manager of the Chevrolet Motor Co., Flint, Mich., retired July 1 after 14 years' service with the company. He originally joined Chevrolet as head of the motor division at Flint and two years later became manager of the Flint plant. In 1923 he was appointed vice-president and placed in charge of all manufacturing. C. E. WETHERALD has succeeded Mr. Barth as general manufacturing manager. He is a General Motors veteran, having become associated with the Buick Motor Car Co. in 1904, resigning in 1911 as superintendent of motor inspection to join the Chevrolet Motor Co. In 1922 he was appointed factory manager at Flint and seven years later assistant general manufacturing manager in charge of the company's plants at Flint, Saginaw and Bay City, Mich. In his new capacity he will supervise manufacture at Chevrolet's 21 domes-

tic factories. F. O. TANNER, heretofore in charge of Chevrolet manufacturing operations at Detroit and Toledo, will become assistant general manufacturing manager, with headquarters at Flint. HUGH DEAN will fill the position vacated by Mr. Tanner. He has recently been manager of the Chevrolet forge, spring and bumper plants in Detroit.

♦ ♦ ♦

CHARLES W. MCKINLEY has been appointed chief development engineer for the AC Spark Plug Co., Flint, Mich., succeeding JOSEPH ZUBATY, who leaves after eight years of service for an extended stay in Europe.

♦ ♦ ♦

A. J. BRANDT on July 1 became Western sales manager of Steel & Tubes, Inc., with offices at 1330 Peoples Gas Building, Chicago. He will have supervision over the Chicago, St. Louis, Minneapolis and Kansas City districts. Mr. Brandt has been connected with the company's main offices in Cleveland.

♦ ♦ ♦

WILLIAM L. CLARK on July 1 assumed new duties as sales manager, J. I. Case Co., Racine, Wis. Originally he was associated with his father in the retail implement business, later becoming salesman and eventually sales manager of leading manufacturers, including Moline Wagon Co., Moline Plow Co., Samson Tractor Co. and Emerson-Brantingham Co. In 1922 he became division manager of the Parker Pen Co., Janesville, and three years ago he was appointed general sales manager.

LEON R. CLAUSON, president, J. I. Case Co., Racine, Wis., has been elected president of the Racine Manufacturers' Association for a sixth term. Reelection was accorded also to the vice-presidents, A. R. CALLENDER, president, Badger Foundry Co., and A. R. JANES, president, Standard Foundry Co. A. F. WALKER, president, American Skein & Foundry Co., retires as treasurer and is succeeded by TAYLOR JELLIFFE, general manager, Wisconsin Metal Products Co.

♦ ♦ ♦

WALTER SHERMAN MOODY, who has been identified for 43 years with the engineering department of the General Electric Co., Pittsfield, Mass., has resigned and will become a consulting engineer. Mr. Moody is a native of Chelsea, Mass., and was graduated in 1887 in the first electrical engineering class at Massachusetts Institute of Technology.

♦ ♦ ♦

WILSON P. HUNT, president, Moline Tool Co., Moline, Ill., has been elected chairman of the executive committee of the Tri-city section of the American Society of Mechanical Engineers. Professor RALPH M. BARNES, of the University of Iowa, has been named vice-chairman and CHARLES A. CARLSON has been made secretary-treasurer.

♦ ♦ ♦

DAVID GEISSINGER, who has been direct factory representative in Pittsburgh for several machine tool manufacturers, has become special representative of the Fort Pitt Steel Casting Co., McKeesport, Pa.

## OBITUARY

EDWARD G. ACHESON, known the world over for his electric furnace products, died of pneumonia in New York on July 6, after a week's illness.

He was born on March 9, 1856, at Washington, Pa., where his grandfather, coming from Ireland, settled in 1788. Dr. Acheson received his

schooling at Bellefonte Academy, but was forced to go to work at 16 when the panic of 1873 swept away his father's business. In 1880 Dr. Acheson entered the employ of Thomas A. Edison at Menlo Park, N. J., then a "fountain head of chemical knowledge and experiment." His first position



EDWARD G. ACHESON



J. A. HATFIELD



W. V. PHILLIPS



RICHARD C. WOOD



was that of assistant draftsman under John Kruesi, father of a past-president of the Electrochemical Society. In July, 1881, Dr. Acheson was sent as first assistant engineer of the Edison interests to the electrical exposition in Paris. He returned to the United States in 1884 and for a time was connected with the Consolidated Lamp Co. of Brooklyn and the Standard Underground Cable Co. of Pittsburgh. The spirit of experiment was strong with him, and electrical and chemical problems engaged his spare hours.

Early in 1891, Dr. Acheson produced in the electric furnace the first sample of Carborundum, the well-known abrasive and refractory. Not long after the invention of Carborundum, he produced the first large sample of artificial graphite. He took ordinary coke and heated it to extremely high temperatures in his electric furnace, the hard brittle coke being transformed into a soft, unctuous product, graphite. And this graphite, which he thus produced artificially, was better and purer than the natural mineral "plumbago" or "black lead" as natural graphite is commonly called. The range of American guns in the World War was increased 20 per cent by surfacing the inner walls with graphite.

In 1928, Dr. Acheson presented to the Electrochemical Society \$25,000 as a trust fund, which was to form the basis of an award every second year of a gold medal and \$1,000 to any man who made a distinguished contribution to any of the branches fostered by the society. He was a member of a number of scientific societies.

♦ ♦ ♦

JAMES ALEXANDER HATFIELD, president of the American Bridge Co., subsidiary of the United States Steel Corp., died on July 4 in the Harkness Pavilion, Medical Center, New York. He was 68 years of age, and had been associated with the iron and steel industry for 50 years. He had been ill only a week. Mr. Hatfield was born in Philadelphia on June 11, 1863. In 1880 he took his first job as an office boy for the Pottstown Iron Co., Pottstown, Pa., soon was promoted to a clerkship, and later became general sales manager, serving in that position until 1896. The next year he became head of the sales force of the Pencoyd Iron Works, Philadelphia, and in 1898 removed to New York to become the company's sales agent. He was appointed assistant to the president in 1900, and in 1901 succeeded to the presidency. In that year the United States Steel Corp. was organized, and Mr. Hatfield became president of the American Bridge Co. of New York and a director of the American Bridge Co. of New Jersey. When the two bridge companies were consolidated in 1914 he was made vice-president of the combined concern, and in 1927 he was elected president.

W. VERNON PHILLIPS, of Philadelphia, died suddenly of heart disease at Jefferson Hospital in that city on July 2. He went to his office as usual in the morning and was taken suddenly ill and died a few hours later. Mr. Phillips spent his entire business life in the iron and steel industry. He was born at Newport, England, Nov. 18, 1875, and came to this country as a youth with his father, Frederick R. Phillips, who was one of the pioneers in the manufacture of tin plate in the United States. At the outbreak of the war Mr. Phillips was chairman of the Perry, Buxton, Doane Co., of Philadelphia and Boston, one of the large dealers in iron and steel scrap. Because of his intimate knowledge of the scrap business, Mr. Phillips was selected as chairman of the subcommittee on iron and steel scrap, which controlled the supplies and prices of that commodity during the war under the general supervision of the War Industries Board and the American Iron and Steel Institute. Several years ago Mr. Phillips dropped from active direction of the Perry, Buxton, Doane Co., though still retaining a financial interest, and for some years had devoted his time to Phillips Brothers, 34 South Seventeenth Street, Philadelphia, importers and jobbers in iron and steel products. Mr. Phillips was also president of the Phillips-Laffitte Co., importer of welding and brazing compounds. After the war he was decorated by the Italian Government for his war-time service. Three of Mr. Phillips's brothers, F. Rees, John J. H., 2nd., and Waldo L., have been associated with him in his various business interests.

♦ ♦ ♦

RICHARD GILPIN WOOD, who came of a family of pioneers in the American iron industry, died on June 30 at the home of his son, Richard G. Wood, Jr., in Lower Merion Township, Pa. He was 82 years old. He retired from an active business career three years ago, when he was chairman of the Alan Wood Steel Co., Conshohocken, Pa. For some years prior to 1920, when he was made chairman, he had served as president of the company, which in 1926 celebrated its one hundredth anniversary. The business was founded in 1826 by James Wood and his son, Alan, and for some time used an old water mill at Wilmington, Del., operating under the name of James Wood & Co. By 1828 the mill was rolling iron sheets in gage from No. 27 to No. 10, and in 1832 a mill was erected at Conshohocken, Pa., and the Wilmington mill was abandoned. Thus began the business with which the deceased became connected. There were numerous changes in name and ownership, though the Wood family continued its interest. In 1901 the Alan Wood Iron & Steel Co. was incorporated. Richard G. Wood, who with others of his family had been owners of the W. Dewees Wood Co., which had a plant at McKeesport,

Pa., acquired an interest in the Alan Wood Iron & Steel Co. Mr. Wood's connection with the business ceased three years ago, when the Koppers Co. of Pittsburgh purchased control. Mr. Wood was made a Chevalier of the Legion of Honor by the French Government in 1919. Two of his sons, who were associated with him in business for many years, Alan and Richard G., Jr., survive.

♦ ♦ ♦

JAMES TOD MCCALL, president of the well known iron and steel firm of Drummond, McCall & Co., Ltd., Montreal, died in that city July 1 in his 75th year. He had been identified with the iron and steel industry of Canada, both as manufacturer and merchant, for the past 50 years and was regarded as the dean of the Canadian trade. He started in the iron trade in Glasgow, and removed to Canada in 1879. Two years later he and the late George E. Drummond formed the firm which this year is celebrating its semi-centennial. Mr. McCall was a director of the Canadian Iron Foundries, Ltd., MacKinnon Steel Corp., Ltd., Royal Trust Co., and the Canadian Cresoting Co. He was prominent in the Montreal Board of Trade and had long been active in civic and charitable organizations.

♦ ♦ ♦

CHARLES H. JOCKMUS, owner of the Ansonia Mfg. Co., Ansonia, Conn., maker of machine screw products and electrical devices, died of heart trouble at his home in New Haven, Conn., on June 29. He was born in Middleville, N. Y., Sept. 17, 1861, and early in life worked for clock manufacturing concerns in Connecticut. Mr. Jockmus founded the Ansonia Mfg. Co. in 1893.

♦ ♦ ♦

TRUMAN T. GAYLORD, vice-president, Westinghouse Electric & Mfg. Co., East Pittsburgh, died suddenly on June 5 at Shelby, Mich., where he had gone on a visit. Mr. Gaylord was born at Shelby 60 years ago and attended the University of Michigan and the Armour Institute of Technology, Chicago. He first entered engineering work in connection with the construction of the Chicago World's Fair buildings, and later returned to the Armour Institute as professor of electrical engineering. He became associated with the Westinghouse company in 1899, and has been with it continuously since that time. Mr. Gaylord was a member of the American Institute of Electrical Engineers, and had been president for two years of the Chamber of Commerce of Pittsburgh.

♦ ♦ ♦

PROF. GEORGE F. SWAIN, prominently identified with the Harvard Engineering School, an ex-professor at the Massachusetts Institute of Technology and a world figure in the engineering profession, died July 1 at Ashland, N. H., aged 74 years.



# Approaching Business Recovery on Permanently Lower Prices

BY DR. LEWIS H. HANEY

DIRECTOR, NEW YORK UNIVERSITY BUREAU OF BUSINESS RESEARCH

**A**S the decline in commodity prices has been checked temporarily, at least, we may be at a turning point in-so-far as raw materials are concerned. Nothing could be more desirable as an indication of approaching business recovery. It is well to remember, however, that commodity prices may be at a permanently lower level than in 1923-1926.

Post-war deflation has considerably reduced the ratio of money and credit in circulation to the volume of transactions requiring the use of money and credit. Throughout a large part of the world, credit has been deflated and business has been placed approximately on a gold basis. This, of course, means an increase in the purchasing power of the dollar or other money unit, and a lower commodity price level.

Again, there has been a large gain in economy of production. Not only have raw materials fallen much more than finished goods, but wages and interest rates have been reduced and the inflated "overhead" expenses of 1928-1929 have been greatly curtailed. The amount of further deflation of credit which may come is uncertain, but the trend is still strong toward reduced costs of production.

It is little short of remarkable how producers have revised their ideas as to production costs (e.g., cotton and copper).

## Recognition of Lower Price Level

Following the announcement of the proposal for a postponement of inter-government war debt payments, a considerable spurt in commodity markets occurred. We should note, however, that the moratorium proposal contained a recognition of the decreased purchasing power of debtors and of the existence of a lower price level. Concessions to Germany are partly based upon the increased difficulty of paying a given sum in gold.

Prior to the moratorium proposal, however, there were signs that the decline in raw material prices had been checked. It was becoming increasingly evident that many commodities were selling at or below cost of production, and this was resulting in increased efforts to curtail output. Prices have become so low that further reductions would both drive out surviving high-cost producers and force wage reductions on organized labor.

## Commodities at Pre-War Levels; Wages Double

Moreover, it seems quite significant that so many commodities have fallen to what are known as "pre-war" levels. For a decade prior to the World War, commodity prices were relatively stable. They

were on a gold basis—at least there was none of the great credit inflation which came with the war. In a sense, therefore, the "pre-war level" may be thought of as measuring a sort of normal relationship between money and commodities. In the writer's opinion the return of so many commodities to pre-war price levels, while wage rates in important cases are approximately 100 per cent higher than pre-war, is highly significant, and suggests a bottom.

As to the future, we note, first, that the statistical position of many of the basic raw materials continues weak, with large visible supplies. This is true of such commodities as cotton, wool, silk, copper, lead and zinc. Industrial production on the average has long been under the level of normal requirements; but demand has been below normal, also. Not only has consumer purchasing power been greatly impaired, but the spending complex has been broken and it is almost "the proper thing" to abstain from taking an expensive summer vacation or buying a high-priced car.

## Little Lack of Real Buying Power

Perhaps the arousing of more hopeful sentiments by the sharp rebound that occurred immediately after the moratorium proposal illustrates how much of the weakness in commodity markets has been due to the "desire" factor, as distinguished from purchasing power. This is obviously the first point of attack. "Where there is a will there is a way," and this is true of the will to buy.

Savings are accumulating and a large number of people have ample incomes. If it is not already here, the time soon will come when to stimulate the desires of people who have good incomes or savings may start the return to normal buying. However small the beginning, that will speedily result in some increase in employment. That in turn will increase the purchasing power of labor and revive the hopefulness of stockholders. As production increases, there will be no need of inflation, for increased production means increased income and purchasing power.

It seems to this writer that the low levels of prices for basic raw materials have probably been seen. The recent rise in so many commodity markets has plainly been highly speculative. It has been based on sentiment. It has largely consisted of a sort of short covering, based on past postponement of purchasing. It is doubtful if the advance in cotton, copper, etc., can be sustained, and some reaction in the commodity price averages is now to be expected.

(ESTABLISHED 1855)

## Ready to Go

WITH the Hoover international debt moratorium now a fact, every one is tensed to move on any sign of business expansion. Determination has taken the place of resignation. Favorable indicators, of which a few have already appeared, will no longer be indifferently regarded. Fears of reaching untoward depths had frozen the cash resources of too many institutions and in cases even locked up the surpluses intended for emergencies. Yet the steel producing industry, which averaged over the entire year of 1921 only 37 per cent of capacity, operated at 63 per cent for all of 1930 and at 45 per cent for the six months of this year. Things have been bad but the mental attitude has been worse. Actual evidence of constructive acts will speed up the machine. There would be some satisfaction if demand would quickly mount even to wear and tear needs.

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## The Railroad Freight Case

The railroads obviously must either increase their income or reduce their expenses.

They can now reduce expenses only by reducing the wages of their labor, their ingenuity having otherwise been exerted to the limit.

They cannot increase income by raising passenger rates, which remain dangerously high, too much business being already lost to motor buses.

The only chance for increasing income is by raising freight rates. In this also there is a danger of diverting traffic to competitive modes of transportation, especially water borne.

A 15 per cent increase in freight rates will probably not produce a 15 per cent increase in freight revenue, for some traffic will be diverted and some will be strangled. Any increase of this nature must come out of the consuming public and is bound to produce dislocations, wherefore the expedient is fraught with economic danger.

The railway personnel ought to see that they are partners in the transportation business and that it is in their own interest to reduce their wages so as to increase the volume of business and so increase their own employment. Unable to see that, or unwilling, and insisting upon the maintenance of a fixed price for labor, there is nothing that the railway companies can do except to raise their prices for freight service.

If such be the only means for amelioration, un-sound and hazardous though it be, a general increase of all freight rates will be less disturbing than discriminatory alterations.

## Do They Wish to Limit Incomes?

IN a recent address at the grave of Senator La Follette, Senator Blaine rebuked the "encroachment of the powerful few on the rights of the many" and alleged that "the massing of immense fortunes and consequently immense incomes, in the possession of the few, is the key to America's misery."

It seems that Congress through income and inheritance taxes has not yet sufficiently scalped the estates and incomes. Logically the next step is to make it illegal for any man to enjoy an income of more than a fixed sum, very moderate, of course. In such an event would the able men take the trouble to earn any more? Would the national income be curtailed and would the tax-gatherer's golden-egg laying goose be killed?

Even the Progressive senators who hate the rich, including the able earners, might become aghast to find that there were no surplus earnings to tax or otherwise confiscate. The Progressive idea is that if one man were prohibited from earning \$100,000 per annum, 100 farmers, or other "economic slaves," would each enjoy \$1000 more. It is far more probable that the prohibition of big incomes would impair rather than enhance the little ones. In the meanwhile many millions of Americans are enjoying very cheap gasoline at the expense of a ten billion dollars investment by many who thought they were thrifty but are not getting any dividends.

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## Trends in Railroad Traffic

THERE is great but divided responsibility for the railroad situation now existing. Also there is criticism of the railroads for "wanting to make money" when many other interests must content themselves with losses.

In the neighborhood of six billions of dollars of railroad bonds are held as investments. In respect to them there are regulations by State laws requiring a certain proportion of earnings to fixed charges, for the safeguarding of insurance companies, savings banks and trusts. The railroads compute that earnings in the first four months of this year were at an annual rate of 2.24 per cent, quite inadequate to meet the requirements. They recognized in their application to the Interstate Commerce Commission for a general 15 per cent advance in freight rates that the Transportation Act does not consider this point, but they do state that if there were the fair return contemplated by the act the legal requirements would be met.

There will be a disposition in some quarters to criticize the state laws for their restrictions. The laws may have been requiring something that was to

become impossible for so many investments that the range would be reduced to securities chiefly of the United States and governmental subdivisions, with yields much lower than contemplated.

The fact is that over a long period of time certain expectations were created, and reasonably enough, of railroads' being able to do better than has since been the case. Of late railroad traffic has not been growing at the old pace, and motor and water transportation, so commonly cited, are not the whole cause of the change.

From the early years until just before the war freight ton-mileage had a way of doubling every 12 years. Random comparisons or a complete series of comparisons all show substantially the same thing. It is a significant thing that the rule worked much better than the old Abram S. Hewitt rule of pig iron's doubling every ten years, which worked only on a give and take basis, one decade being short and another long, whereby the more accurate rule was one of quadrupling in 20 years. Railroad traffic suffered much less from periodic depressions.

The average annual rate of increase, with a doubling in 12 years, was 6 per cent. From 1912 to 1920, substantially comparable years but with 1920 somewhat the better, there was an average annual increase of only 5 per cent, representing a doubling in a little more than 14 years. One cause of this slowing down was the spread of population and the migration of factories, whereby for a given amount of activity somewhat less transportation was required.

For recent years there is an interesting method of comparison, for we have the Federal Reserve Board's index of industrial production, including manufacturing and mining, carefully compiled and recently revised. We can set freight traffic against it. Taking 1923 as base, railroad freight ton-miles have been as follows relative to the industrial index:

*Freight Ton-Miles Related to  
Industrial Production*

1923.....100	1927..... 99
1924..... 97	1928..... 95
1925..... 97	1929..... 92
1926.....100	1930..... 97

Certainly in the long period before the war industrial activity was not increasing nearly so rapidly as would involve a doubling in 12 years. Freight traffic was therefore gaining more rapidly than industrial activity. Since 1923 it has been increasing less rapidly than industrial activity. Ideas were long ago created as to what a railroad could easily earn, but lately the circumstances have changed. The question is simply who should take the consequences.

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THE Sherman law was intended among other things to protect the small producer and to preserve competition. It may preserve competition, which may be immaterial, but there is no doubt in respect of its operation as an extinguisher of the small producer.

## Much Pig Iron by Few Furnaces

A NEW presentation is made in the annual statistical report of the American Iron and Steel Institute, showing for the last five years the number of blast furnace-days worked in making coke pig iron (excluding ferroalloys), with a computation of the average production per blast furnace-day. Hitherto a close approximation has been possible, the monthly blast furnace report of THE IRON AGE showing the number of furnaces in blast on the first day of each month. Several references have been made in this department to the remarkable increase in output per furnace.

The precise figures now show that average daily output rose year by year, from 500.9 tons in 1926 to 603.5 tons in 1930, the count excluding ferroalloys and charcoal pig. That is a remarkable achievement as an average.

When the Duquesne furnaces were built in 1896 they represented a great step, the furnaces being larger and being given much more wind. They were rated at a prospective 600 tons, but it was some time before this was achieved for even a single day. The 1898 directory rated the four stacks at 750,000 tons a year, but at 600 tons daily this represented an average idleness of 5.2 months in three years, whereby it may be assumed the directory rating was under 600 tons. Now the whole industry shows this average, and so long as smaller furnaces survive and pull down the average, the production of, say, the fifty best stacks must be far above 600 tons daily.

Some interesting things can be worked out from the new table. The number of coke blast furnaces engaged in making pig iron at any time decreased from 264 in 1926 to 236 in 1929 and to 201 in 1930. Dividing the number of furnaces into the number of furnace-days worked, it is found that in 1926 the furnaces that ran at all produced during only 80 per cent of the time; in 1927, 78 per cent; in 1928, 76 per cent; in 1929, 83 per cent; and in 1930, 42 per cent. Disregarding the off years, in the three big years the furnaces that ran at all averaged only 80 per cent of the time, representing a much greater deficiency than is necessary for relining, as it amounts to a rate of seven months idleness every three years.

An interesting point is the large number of furnaces continuously idle. Occasionally a percentage is computed of the number of furnaces in blast against the total number in existence, but such computations mean very little, for big stacks are rated against little stacks. There is no particular salvage incentive to hasten the abandonment of a furnace. The total number of coke furnaces decreased from 376 at the end of 1925 to 293 at the end of 1930. Some of these furnaces make ferroalloys, hence the number is not directly comparable with the numbers just cited, of coke furnaces in blast making pig iron. Estimating the number of furnaces so engaged, it appears that in 1926 only 74 per cent of the total number of coke furnaces operated at any time in the year; in 1927, 69 per cent; 1928, 71 per cent; 1929, 76 per cent; 1930, 69 per cent.

Total blast furnace capacity as reported by the pro-



ducers includes that of furnaces requiring a very good market to bring them in. The official statement shows 293 coke furnaces Dec. 31, 1930, but excludes 21 as having been long idle. The remainder are rated at 51,706,775 tons of pig iron plus 809,100 tons of ferro-alloys. Record production of coke pig iron was 41,619,022 tons, in 1929, while 856,768 tons of ferro-alloys was made that year.

## CORRESPONDENCE

### Too Much Emphasis on Wages

*To the Editor:* All this agitation about wage maintenance is pure economic rot. Those who made millions in our recent prosperous times by forcing values far above those that would net a legitimate profit are the ones who today prate their high regard for the workmen by insisting on wage maintenance.

Workmen in my own factory tell me they can buy much more for their dollar today (June 13, 1931) than they could a year ago. Maintaining wages under these conditions is economically unsound. Every commodity price must recede before a balance can be struck.

It is quite true that if drastic wage reductions had been made in 1930 very foolish strikes would have occurred, principally through lack of understanding. Maintenance of wage levels probably has prevented strikes, and it has also given the wage earner sufficient time to realize the necessity for general wage reductions, without inflicting any great harm.

Some say that reduction in production costs and increase in average consumer income is the sure way to bring prosperity. Is this economic? Lower the price of one and raise the price of the other? All commodities must recede. One cannot be raised and the other lowered. Such manipulations prolong the depression.

If all of the so-called great minds would cease publishing panaceas for this depression and especially cease endeavoring to stabilize and syndicate prices and attend strictly to their business in finding ways to reduce manufacturing and distribution costs and be satisfied with a legitimate profit (wages will take care of themselves), the United States would have more than a great chance to pull out of a dangerous position.

St. Louis.

L. J. REKSEM.

### Plant Making Seasonal Product

(Concluded from page 107)

have replaced wire straightening, wire-cutting and kinking and a wire-looping machine. In this, No. 11 gage wire is uncoiled, cut to length, kinked at proper intervals, and in a second machine small loops of 1.25 x 0.078 in. dead-soft flat wire are linked across parallel wires, the final operation being stretching the wire fabric across the frame of heavy angles with small helical springs attached at each end.

In making up the large helical springs used for

better grade glider seats, spring wire is cut to length and coiled, transferred to a tying machine, where the end of the spring wire is knotted in, and the springs are then accumulated in steel drums and moved into an oven, where they are heat treated at 650 deg. F., for tempering.

Although the Bunting company in its past 100 years of operation has made standard bed springs, and similar products, it has specialized on gliders, hammocks, and sun couches in recent years. However, to reduce seasonal variation in production, by providing more evenly balanced output throughout the year, the company is considering resuming manufacture of coil bed springs and metal chairs to maintain operating schedules in the out-of-season months.

### Cupola Melting of Brass

(Concluded from page 83)

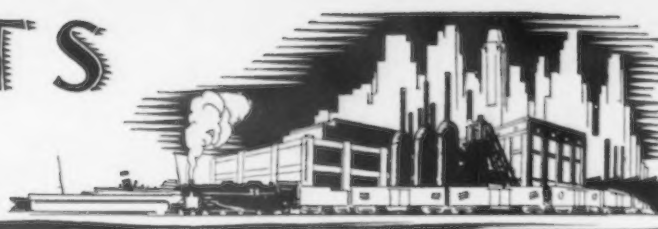
loss is in zinc, with practically none in copper, lead and tin. The metal is brought to proper composition by the addition of 1.5 to 2.5 per cent zinc to the crucible. In connection with the 80-10-10 alloy, the main loss is in lead with a slight loss in tin and scarcely none in copper. This alloy is brought to proper analysis by adding 1 to 2 per cent lead. The loss varies with the temperature of the metal and the length of time it is held in the cupola. An extremely hot metal, held in the cupola too long, will show a higher loss than a medium-temperature metal which is tapped promptly. Loss of zinc and lead is apparently by volatilization rather than by oxidation. Our experience is that loss in melting is considerably less in the cupola than in open-flame furnaces.

A metal charge of 550 lb. is used, the cupola holding from two to three charges depending on the bulkiness of the materials. The bed charge consists of 200 lb. of coke; the average weight of coke between charges is 34 lb. The amount of coke is increased or decreased according to temperature of metal desired. The cupola will melt about 10 tons a day, being operated by two men, the cupola tender and the man making up the charges.

Fixed carbon fuel, a form of pitch coke produced by the Barrett Co., is used in the cupola under license arrangement. It runs 98 per cent and better in fixed carbon and is low in sulphur and ash, making it an ideal fuel for non-ferrous cupola operation.

A large percentage of the material manufactured consists of carbureter castings and bushings. Some of the former are light and are poured at a temperature as high as 2300 deg. F. The cupola takes the place of oil and gas-fired crucible and open-flame furnaces. A few of these still are used for melting aluminum, manganese bronze and other alloys, the demand for which is comparatively light and in small quantities at any time. On account of the high zinc loss, the cupola is not recommended for melting alloys high in zinc content.

# MARKETS



## Confidence Returning; Bottom of Decline Believed Near

**E**FFECTS upon the business world of the final accord in international debt suspensions are not yet tangible, but the steel industry is confident that when the adverse seasonal influences are out of the way there will be a gradual recovery from current low levels.

Meanwhile, curtailment of steel production continues, the average rate for the country this week being estimated at 33 per cent of capacity against 35 per cent a week ago. The belief is gaining ground that July will represent the minimum of demands and that August will bring at least a slight upward turn.

**P**IG iron and steel output figures for June reflect the sharpness of the decline in consumption. The pig iron total for June was 1,638,627 tons, a drop of 18 per cent from May, and the smallest total for any month since February, 1922. There was a net loss of 14 blast furnaces, bringing the number in service on July 1 to 91, or less than for any month since September, 1921. The daily pig iron output in June was 54,621 tons against 64,325 tons in May. Excepting last December, this daily rate was the lowest since January, 1922.

Steel ingot production in June reached a point which, with last December omitted, was the lowest since July, 1924, based on the average daily rate of 79,843 tons, a drop of 17 per cent from that of May. The total output for the month was 2,075,910 tons and that for the six months was 15,258,519 tons, or 35 per cent below the total for the corresponding period of 1930, and the smallest first-half total since 1922.

In the past, such extremely low production records in pig iron and steel have almost invariably been followed within a short time by fairly decided gains.

**A**PPRAISAL of the near-term prospects suggests that recovery may most logically be expected from general business improvement in many sources rather than from largely increased requirements of any one or two major lines of consumption. The automobile industry anticipates no marked gains in schedules during July and August, and its current low output and expected shutdowns are cutting severely into orders for steel. Cars to be produced this month will number not much above 200,000 against 250,000 to 260,000 estimated for June.

Building construction is one of the mainstays of current steel production and offers promise of further

expansion in the light of the large number of large projects pending. Hope for increased railroad buying revolves around the prospective advance in freight rates, but, as latest developments indicate that higher rates, if allowed, will not become effective before late in the year, this influence cannot yet be reckoned with either as to early railroad purchases or in hastening a general buying movement.

**R**ETURNING confidence has added further strength to scrap markets at Pittsburgh and Detroit, has greatly improved the competitive situation in steel with respect to prices and has turned the attention of the steel industry to future prospects rather than to magnification of the ills of the present.

Although the price of heavy melting steel scrap at Pittsburgh is unchanged, other steel-making grades are higher, and bids submitted on railroad offerings of scrap were fully 50c. a ton higher than those of a month ago. Strength in scrap has come not from consumer buying, but from speculative purchases of dealers, who foresee possible profits in the early fall from stocks bought now.

Except for some irregularities in reinforcing bars in a few districts, steel prices are more stable than they have been in months. The apparent success of sheet and strip makers in establishing higher levels for the third quarter, although these prices have not yet had a real test, is bolstering quotations on nearly all products. Last-minute buying of sheets at the old prices brought in sufficient tonnage to give a fair operation to some sheet mills that might have been shut down for part of this month.

**P**IG iron sales have gained in some districts. At Cleveland and New York they have been the largest for any week since March. However, the usual quarterly buying movement is not under way, most consumers preferring to take iron as they need it.

Structural steel awards were only 15,500 tons in the week, while new projects amounted to 26,500 tons. The Lycoming Natural Gas Co. has ordered 20,000 tons of 20-in. pipe, mostly seamless, from Pittsburgh mills.

**THE IRON AGE** composite prices are unchanged. Finished steel is 2.137c. a lb., pig iron \$15.59 a ton and heavy melting scrap \$9.17. Finished steel is 96c. a ton lower than a year ago, pig iron is off \$1.66 and scrap is \$3.91 lower.



# PITTSBURGH

## Volume of Buying Has Not Yet Responded to Improved Sentiment

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**P**ITTSBURGH, July 7.—The holiday week-end brought only a slight interruption in releases for finished steel products, and business this week seems to be continuing at about the level which prevailed during the last half of June. Despite greatly improved sentiment among both buyers and sellers of steel, the volume of new orders has not increased nor have current releases. Even considering the holiday tonnage, releases in some lines still reflect seasonal curtailment.

In a number of consuming industries summer suspensions have already begun, and many other plants contemplate a vacation of two weeks or more between now and the middle of August. Steel company salesmen are generally being urged to take their vacations during July, and in some cases employers are insisting upon this. This will naturally ease such selling pressure as is exerted by steel producers, and prepare the way for more activity later.

A survey of the principal steel-consuming industries reveals little that had not been generally expected for the summer. Automobile production is still declining, and, with the exception of one large producer, the leading makers of automobiles have gradually adjusted their schedules downward to meet light summer demand. Shipments of structural steel and reinforcing bars to the building industry are holding up fairly well, and are one of the mainstays of raw steel production. Otherwise steel building products are very quiet because activity in this industry continues to be confined principally to public works.

While the total volume of pipe line awards thus far in the year has fallen under that of the last two years, a number of fair-sized tonnages have been placed and Pittsburgh mills booked 20,000 tons for a natural gas project last week. Some pipe line inquiry is still outstanding, but most of the projects for 1931 completion have probably been let. Recent expansion in electric weld and seamless pipe capacity has been such that large orders do not last very long, and backlog tonnage which was common even last year cannot be expected to be such a factor in the future.

Barge buying still promises to bring out considerable steel tonnage, but a number of prospective purchasers are awaiting an upturn in general business. Miscellaneous demand for steel products coming from warehouses and small consumers continues very steady, although orders are very small

**Short shut-downs of consuming industries have already begun.**

\* \* \*

**Most oil and gas lines for 1931 construction have probably been covered.**

\* \* \*

**Steel-making operations are about 33 per cent of capacity, or 2 points off in the week.**

\* \* \*

**With better business sentiment and with no selling pressure, small lot orders go at full prices.**

\* \* \*

**Coal strike, in face of light demand, is without market effect.**

\* \* \*

**Scrap material is higher.**

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and represent only immediate needs.

Pig iron production in the Pittsburgh district has been further curtailed by the blowing out of one stack and the banking of another by the leading independent maker. This leaves only 8 active furnaces now being operated by the independents in the Pittsburgh district, including Johnstown, out of a possible 30. The United States Steel Corporation is operating 9 of a possible 38. In the same week last year 21 Steel Corporation stacks were active and 16 independent units were making iron.

Steel ingot production, estimated this week at approximately 33 per cent of capacity, compares with 60 per cent in the same week last year. In the Wheeling district, where ingot production is at about 45 per cent, considerable raw steel is being accumulated. Production in the Valleys has held at about 35 per cent, despite the week-end interruptions. Finishing mill activity has not changed on the whole because of slight increases in production of sheets and strip steel. Output of tin plate is holding at 65 per cent of capacity, with current shipments averaging considerably higher.

If improved business sentiment has not affected production, it has at least had a beneficial effect upon prices. Steel companies are not pressing for business because of the generally recognized summer inactivity, and as a result current small lot orders are nearly all bringing the full quoted prices. No new buying in sheets and strip is reported, as most consumers

covered for their July needs before quotations were advanced. The real test of these prices will come in the latter half of the month.

The market for raw materials is still dull, and the effects of the coal strike are less and less pronounced. Demand for coal and coke is so light that the decreased production has had no influence on the market. Scrap prices are strong and some grades have advanced slightly. Bidding on the current railroad lists brought out prices at least 50c. over those quoted one month ago.

### PIG IRON

The Westinghouse Electric & Mfg. Co. has placed a small tonnage of No. 2 and No. 1 iron for its Trafford, Pa., foundry to cover needs for the last six months of the year. The company also bought for its Cleveland and Attica, N. Y., plants. The Trafford business is said to have been divided between a Cleveland furnace and a local steel-making interest. No other forward buying is reported. Consumers in this district seem to be buying only in carload lots for their immediate needs. Prices on foundry, malleable and Bessemer iron are holding at \$17, Valley furnace, or \$17.50, Pittsburgh district furnace. Quotations on basic iron are nominal.

Prices per gross ton, f.o.b. Valley furnace:	
Basic .....	\$15.50 to \$16.00
Bessemer .....	17.00
Gray forge .....	16.50
No. 2 foundry .....	17.00
No. 3 foundry .....	16.50
Malleable .....	17.00
Low phos., copper free....	26.66 to 27.00

Freight rate to Pittsburgh or Cleveland district, \$1.76.

Prices per gross ton, f.o.b. Pittsburgh district furnace:

Prices per gross ton, f.o.b. Pittsburgh district furnace:	
Basic .....	\$16.00 to \$16.50
No. 2 foundry .....	17.50
No. 3 foundry .....	17.00
Malleable .....	17.50
Bessemer .....	17.50

Freight rates to points in Pittsburgh district range from 63c. to \$1.13.

### SEMI-FINISHED STEEL

No new buying is reported, and shipments have been light thus far in the new month. Billets, slabs and sheet bars are unchanged at \$29 to \$30 a ton, Pittsburgh, while forging billets are quoted at \$35. Makers of wire rods have generally covered their third quarter needs at \$35, Pittsburgh, but releases are light.

### RAILS AND TRACK SUPPLIES

Except for the rail inquiry of the Norfolk & Western, little new business is before the market, and releases this month are expected to fall under June levels. Some mills still have a fair



# A Comparison of Prices

Market Prices at Date, and One Week, One Month and One Year Previous,  
Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron, Per Gross Ton:	July 7, 1931	June 30, 1931	June 9, 1931	July 8, 1930
No. 2 fdy., Philadelphia.....	\$17.01	\$17.01	\$17.26	\$19.76
No. 2, Valley furnace.....	17.00	17.00	17.00	18.00
No. 2, Southern, Cin'tl.....	14.69	14.69	14.69	16.69
No. 2, Birmingham.....	12.00	12.00	12.00	14.00
No. 2 foundry, Chicago.....	17.50	17.50	17.50	18.00
Basic, del'd eastern Pa.....	16.75	17.00	17.00	18.75
Basic, Valley furnace.....	15.50	15.50	15.50	18.00
Valley Bessemer, del'd P'gh..	18.76	18.76	18.76	20.23
Malleable, Chicago.....	17.50	17.50	17.50	18.00
Malleable, Valley.....	17.00	17.00	17.00	18.50
L. S. charcoal, Chicago.....	25.04	25.04	25.04	27.04
Ferromanganese, furnace.....	†\$5.00	†\$5.00	†\$5.00	94.00

\*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.

†Ferromanganese quotations adjusted to carload unit; larger quantities at discounts.

Rails, Billets, etc., Per Gross Ton:	July 7, 1931	June 30, 1931	June 9, 1931	July 8, 1930
Rails, heavy, at mill.....	\$43.00	\$43.00	\$43.00	\$43.00
Light rails at mill.....	34.00	34.00	34.00	36.00
Rerolling billets, Pittsburgh..	29.00	29.00	29.00	31.00
Sheet bars, Pittsburgh.....	29.00	29.00	29.00	31.00
Slabs, Pittsburgh.....	29.00	29.00	29.00	31.00
Forging billets, Pittsburgh.....	35.00	35.00	35.00	36.00
Wire rods, Pittsburgh.....	35.00	35.00	35.00	36.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb....	1.65	1.65	1.65	1.70

Finished Steel, Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Bars, Pittsburgh.....	1.65	1.65	1.65	1.65
Bars, Chicago.....	1.70	1.70	1.70	1.75
Bars, Cleveland.....	1.65	1.65	1.65	1.75
Bars, New York.....	1.98	1.98	1.98	1.98
Tank plates, Pittsburgh.....	1.65	1.65	1.65	1.65
Tank plates, Chicago.....	1.70	1.70	1.70	1.75
Tank plates, New York.....	1.93	1.93	1.93	1.93
Structural shapes, Pittsburgh..	1.65	1.65	1.65	1.65
Structural shapes, Chicago....	1.70	1.70	1.70	1.75
Structural shapes, New York...	1.90 1/2	1.90 1/2	1.90 1/2	1.90 1/2
Cold-finished bars, Pittsburgh..	2.10	2.10	2.10	2.10
Hot-rolled strips, Pittsburgh..	1.55	1.55	1.55	1.65
Cold-rolled strips, Pittsburgh..	2.15	2.15	2.15	2.45

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our market reports on other pages.

Finished Steel, Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Hot-rolled annealed sheets, No. 24, Pittsburgh.....	2.40	2.40	2.15	2.55
Hot-rolled annealed sheets, No. 24, Chicago dist. mill..	2.50	2.50	2.35	2.65
Sheets, galv., No. 24, P'gh....	2.90	2.90	2.75	3.15
Sheets, galv., No. 24, Chicago dist. mill.....	3.00	3.00	2.90	3.25
Hot-rolled sheets, No. 10, P'gh	1.70	1.70	---	---
Hot-rolled sheets, No. 10, Chicago dist. mill.....	1.80	1.80	---	---
Wire nails, Pittsburgh.....	1.80	1.80	1.80	2.05
Wire nails, Chicago dist. mill..	1.85	1.85	1.90	2.15
Plain wire, Pittsburgh.....	2.20	2.20	2.20	2.30
Plain wire, Chicago dist. mill..	2.25	2.25	2.25	2.35
Barbed wire, galv., P'gh.....	2.55	2.55	2.55	2.80
Barbed wire, galv., Chicago dist. mill.....	2.60	2.60	2.60	2.85
Tin plate, 100 lb. box, P'gh..	\$5.00	\$5.00	\$5.00	\$5.25

Old Material, Per Gross Ton:				
Heavy melting steel, P'gh....	\$10.25	\$10.25	\$10.25	\$14.75
Heavy melting steel, Phila....	8.50	8.50	9.50	12.50
Heavy melting steel Ch'go....	8.75	8.75	8.75	12.00
Carwheels, Chicago.....	10.00	10.00	10.00	13.50
Carwheels, Philadelphia.....	12.00	12.00	12.00	14.50
No. 1 cast, Pittsburgh.....	10.50	10.25	10.25	13.50
No. 1 cast, Philadelphia.....	11.50	11.50	11.50	13.00
No. 1 cast, Ch'go (net ton)...	9.00	9.00	9.00	12.00
No. 1 R.R. wrot., Phila.....	10.00	10.00	10.00	15.00
No. 1 R.R. wrot., Ch'go (net)	7.00	7.00	7.50	10.00

Coke, Connellsville, Per Net Ton at Oven:				
Furnace coke, prompt.....	\$2.40	\$2.40	\$2.40	\$2.50
Foundry coke, prompt.....	3.50	3.50	3.50	3.50

Metals, Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York.....	9.12 1/2	9.12 1/2	8.37 1/2	12.12 1/2
Electrolytic copper, refinery..	8.00	8.00	8.00	11.25
Tin (Strait), New York.....	24.00	25.20	22.45	29.75
Zinc, East St. Louis.....	3.95	3.90	3.25	4.10
Zinc, New York.....	4.30	4.25	3.60	4.45
Lead, St. Louis.....	4.22 1/2	4.22 1/2	3.60	5.15
Lead, New York.....	4.40	4.40	3.75	5.25
Antimony (Asiatic), N. Y....	7.00	7.05	6.20	7.00

tonnage of orders on their books, but the carriers are not specifying freely.

## BARS, PLATES AND SHAPES

Movement of the heavy hot-rolled products this month show little change, with possibly a slight decline in merchant bars. Reinforcing bars are quiet so far as new business is concerned, but shipments against old contracts are holding up fairly well. The same might be said of structural shapes, but fabricators are complaining of a lack of small orders, while the larger projects are unevenly distributed among the various shops. A high school at Rochester, N. Y., on which bids will be taken July 9, will require 1400 tons of shapes. Demand for plates is spotty, with the chief consuming industries occupied at a low rate. Not much skelp is needed in this district, and oil tankage work is scarce. Several sizable barge inquiries are said to be forthcoming, but some companies are not making commitments before they see definite signs of improved business. It is reported that one company may pur-

chase as many as 200 barges within the year.

Prices are generally well maintained on the ordinary run of business, although large structural shape and reinforcing bar inquiries usually bring out concessions.

## SHEETS

Last-minute orders for sheet steel products at the end of the quarter made last week one of the best in three months for sheet producers, and brought about a slight increase in production at a number of plants. Orders for black and galvanized sheets were particularly heavy, and were very encouraging from a numerical standpoint. In some cases tonnage purchased represented only July requirements, as consumers have no desire to commit themselves further in advance. Operations are slightly heavier this week as a result of recent tonnage, and are estimated at 35 per cent of capacity. Next week may show a further gain, but some of the smaller producers are expected to close down entirely for a short time between now and Aug. 15.

While the new sheet prices have not received adequate test, the market is strong from a sentimental standpoint, and most mills believe the recently announced higher asking prices will hold. With little heavy tonnage business coming in, a great deal will depend upon the tendencies in the automobile industry.

## TIN PLATE

Shipments during June were exceptionally high in the case of the leading producers, and tonnage movement in July is not expected to fall off very much. Operations continue at approximately 65 per cent of capacity for the industry as a whole, with two or three producers running full. Some makers are able to schedule their operations for as much as two weeks in advance. The official price is unchanged at \$5 a base box, Pittsburgh.

## STRIP STEEL

While this industry has reflected the downward trend in the requirements of the automotive industry, miscellaneous demand is holding up fairly well, and tonnage last week was some-

## THE IRON AGE COMPOSITE PRICES

Finished Steel		Pig Iron	Steel Scrap
July 7, 1931	2.137c. a Lb.	\$15.59 a Gross Ton	\$9.17 a Gross Ton
One week ago	2.137c.	15.59	9.17
One month ago	2.102c.	15.63	9.50
One year ago	2.185c.	17.25	13.08
Based on steel bars, beams, tank plates, wire, rails, black pipe and sheets. These products make 87 per cent of the United States output.		Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.	
Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.			
High	Low	High	Low
1931.....	2.142c., Jan. 13; 2.102c., June 2	\$15.90, Jan. 6; \$15.59, June 30	\$11.33, Jan. 6; \$9.08, June 23
1930.....	2.362c., Jan. 7; 2.121c., Dec. 9	18.21, Jan. 7; 15.90, Dec. 16	15.00, Feb. 18; 11.25, Dec. 9
1929.....	2.412c., April 2; 2.362c., Oct. 29	18.71, May 14; 18.21, Dec. 17	17.58, Jan. 29; 14.08, Dec. 3
1928.....	2.391c., Dec. 11; 2.314c., Jan. 3	18.59, Nov. 27; 17.04, July 24	16.50, Dec. 31; 13.08, July 2
1927.....	2.453c., Jan. 4; 2.293c., Oct. 25	19.71, Jan. 4; 17.54, Nov. 1	15.25, Jan. 11; 13.08, Nov. 22
1926.....	2.453c., Jan. 5; 2.403c., May 18	21.54, Jan. 5; 19.46, July 13	17.25, Jan. 5; 14.00, June 1
1925.....	2.560c., Jan. 6; 2.396c., Aug. 18	22.50, Jan. 13; 18.96, July 7	20.83, Jan. 13; 15.08, May 5

what heavier because of the prospective price increase. One mill reports that over 90 per cent of its customers have contracted for third quarter at 1.55c. and 1.65c., Pittsburgh, for hot-rolled strip, and 2.15c. for cold-rolled. Others are buying only for their immediate needs, and may be expected to place contracts within a few weeks if the prices continue firm. Strip operations are unchanged from last week, following a general suspension of activity over the holiday week-end.

### TUBULAR GOODS

The Lycoming Natural Gas Co. has purchased approximately 20,000 tons of pipe for a 20-in. gas line to run from the Tioga, Pa., fields to Syracuse, N. Y. Most of the pipe will be seamless and will be produced by the National Tube Co., although a part of the order went to Spang, Chalfant & Co. for lapweld material. No other large pipe line projects seem to be immediately pending, and reports that the large line projected by the Irak Petroleum Co. in Asia Minor has been placed cannot be confirmed in this district. It is believed that if American mills do participate in this business, it will be widely distributed among the various pipe makers. Furnace welded pipe is still very dull, with what little demand there is concentrated in the butt-weld department.

### WIRE PRODUCTS

Demand seems to have held the slight gains reported last week from some quarters, and heavier orders from the agricultural districts are said to be responsible. Manufacturers' wire is very quiet, and declining automotive demand promises even further downward revision. Wire quotations are holding fairly well, with nails priced by most makers at \$1.80 a keg, Pittsburgh, and manufacturers' wire at 2.20c.

### COKE AND COAL

The effects of the coal strike on the coal and coke markets are less pro-

nounced than was the case a fortnight ago, and production of coal in the country as a whole has not been curtailed very much. In the Pittsburgh territory mines are about 50 per cent active. Prices on coal are fairly well maintained, but no talk of advance is heard. Coke is also quiet, with the foundry grade quotable at \$3.25 to \$3.50 per ton, Connellsville, while furnace coke is still \$2.40, Connellsville. Coke is less affected than coal by strike activity.

### OLD MATERIAL

Further evidence of strength in the scrap market is offered by the price paid for the monthly railroad lists. No. 1 heavy melting steel on the Pennsylvania list is reported to have been taken by dealers at prices ranging up to \$10.90, and the average of bids made was fully 50c. a ton over prices offered a month ago. In the absence

of mill purchases, no change is made in the quoted prices on heavy melting steel this week, although rails and compressed sheets are definitely stronger. Mills have offered as high as \$10.50 for rails, and compressed sheets are almost as strong. Specialties are also higher as the result of better consumer demand, but no change has been made in the blast furnace grades. No. 1 cast is also up slightly.

Prices per gross ton delivered consumers' yards in Pittsburgh and points taking the Pittsburgh district freight rate:

Basic Open-Hearth Grades:	
No. 1 heavy melting steel.....	\$10.00 to \$10.50
No. 2 heavy melting steel.....	9.25 to 9.75
Scrap rails.....	10.00 to 10.50
Compressed sheet steel.....	9.75 to 10.25
Bundled sheets, sides and ends.....	8.50 to 9.00
Cast iron car wheels.....	10.50 to 11.00
Sheet bar crops, ordinary.....	11.00 to 11.50
Heavy breakable cast.....	8.00 to 8.50
No. 2 railroad wrought.....	10.00 to 10.50
Hvy. steel axle turnings.....	9.00 to 9.50
Machine shop turnings.....	6.50 to 7.00

Acid Open-Hearth Grades:	
Railr. knuckles and couplers.....	12.75 to 13.25
Railr. coil and leaf springs.....	12.75 to 13.25
Roller steel wheels.....	12.75 to 13.25
Low phos. billet and bloom ends.....	14.50 to 15.00
Low phos. mill plates.....	12.00 to 12.50
Low phos. light grades.....	12.00 to 12.50
Low phos. sheet bar crops.....	13.00 to 13.50
Heavy steel axle turnings.....	9.00 to 9.50

Electric Furnace Grades:	
Low phos. punchings.....	13.50 to 14.00
Heavy steel axle turnings.....	9.00 to 9.50

Blast Furnace Grades:	
Short shoveling steel turnings.....	6.75 to 7.25
Short mixed borings and turnings.....	6.75 to 7.25
Cast iron borings.....	6.75 to 7.25

Rolling Mill Grades:	
Steel car axles.....	16.50 to 17.50

Cupola Grades:	
No. 1 cast.....	10.00 to 11.00
Rails 3 ft. and under.....	12.50 to 13.00

Canada Wire & Cable Co., Montreal, has begun operation of its new hot copper rod mill, which has just been installed by the United Engineering & Foundry Co., Pittsburgh. The mill will roll all types of copper rods, and contains many innovations in non-ferrous rolling mill practice. The installation was made in record time, the order having only been placed in October, 1930.

### Warehouse Prices, f.o.b. Pittsburgh

*Base per Lb.	
Plates.....	2.85c.
Structural shapes.....	2.85c.
Soft steel bars and small shapes.....	2.60c.
Reinforcing steel bars.....	2.60c.
Cold-finished and screw stock—	
Rounds and hexagons.....	3.10c.
Squares and flats.....	3.60c.
Bands.....	2.95c.
Hoops.....	3.95c.
Hot-rolled annealed sheets (No. 24), 25 or more bundles.....	3.05c.
Galv. sheets (No. 24), 25 or more bundles.....	3.40c.
Hot-rolled sheets (No. 10).....	3.10c.
Galv. corrug. sheets (No. 28), per square (less than 3750 lb.).....	3.74c.
Spikes, large.....	2.65c.
Small.....	2.90c. to 3.05c.
Boat.....	3.15c.
Track bolts, all sizes, per 100 count, 60 and 10 per cent off list	
Machine bolts, 100 count, 60 and 10 per cent off list	
Carriage bolts, 100 count, 60 and 10 per cent off list	
Nuts, all styles, 100 count, 60 and 10 per cent off list	
Large rivets, base per 100 lb.....	\$3.20
Wire, black, soft ann'd, base per 100 lb.....	2.30
Wire, galv. soft, base per 100 lb.....	2.75
Common wire nails, per keg.....	2.05
Cement coated nails, per keg.....	2.05

\*On plates, structurals, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applies to orders of 400 to 999 lb.



# CHICAGO

## Iron and Steel Production Declines Further in Dull Market

**C**HICAGO, July 7.—The Chicago iron and steel market is one of hope rather than of realization. Steel production, which receded prior to the holiday to about 30 per cent of capacity, is still weighed down. Orders are not sufficient to bring a rebound to the rate of early last week.

The leading producer has not returned to service the blast furnace at Joliet, and a stack banked late last week at Gary is still on the idle list. There are now only nine of 36 steel mill blast furnaces in operation in this district, and even at this rate cold iron is being accumulated by some mills, which already have more iron on the ground than is customary.

The light order mails of Monday and Tuesday were distinctly a disappointment. However, the market is feeling the effect of temporary industrial shutdowns and the fact that many plant executives, taking advantage of the present dullness, stretched holiday absences to several days.

Consumers are beginning to study more closely the probable effects of new world-wide movements, as well as those within our own country. It is computed that the requested advance in freight rates will raise the cost of producing coke and pig iron in this district from about 50c. to \$1 a ton. Whether producers will raise prices in order to pass this on to users must remain to be settled in accordance with market conditions when and if the rate structure is changed. The rail transport of fuel to Chicago mills will also bring this subject to bear on the steel price structure.

### FERROALLOYS

Shipments of these commodities, having dropped off sharply, show no tendency to turn upward. Lack of inquiries and sales mark this as one of the dullest periods so far this year.

### COKE

Shipments of by-product foundry coke are near the low point of the year, with no prospect of an immediate turn upward. Prices are steady at \$7.50 a ton, local ovens. The cost of transporting coal by rail to Chicago ovens may become a serious factor as to prices should the freight rate structure be changed.

### PIG IRON

Buying of Northern foundry iron for the third quarter and last half has made some headway, but it is still far from the proportions of what might be called a buying movement. Shipments have steadily fallen since the beginning of the month, and, with so many major consuming lines at very low output, there has been no rebound since the holiday. Produc-

Steel plant operations, down to 30 per cent at week end, have not gained since holiday.

Only nine of 36 steel mill blast furnaces in Chicago district in service.

Industrial shutdowns and extended week-end absences of plant executives affect iron and steel market.

Probable effect of expected advance in freight rates on production costs and selling prices being studied.

Pig iron shipments have fallen off. Third quarter buying is in small volume.

tion has been pared down to an uncommonly low output per furnace, which after all gives better flexibility in meeting the immediate demands of consumers than would be the case if one or two stacks were banked. There is much speculation as to the effect that contemplated changes in freight rates will have on prices for pig iron.

Prices per gross ton at Chicago:

N'th'n No. 2 fdy., sil. 1.75 to 2.25	\$17.50
N'th'n No. 1 fdy., sil. 2.25 to 2.75	18.00
Malleable, not over 2.25 sil.	17.50
High phosphorus	17.50
Lake Super. charcoal, sil. 1.50	\$25.04 to 27.04
S'th'n No. 2 fdy.	17.01
Low phos., sil. 1 to 2, cop-per free	28.50 to 29.20
Silvery, sil. 8 per cent	24.79 to 26.79
Bess. ferrosilicon, 14-15 per cent	35.79

Prices are delivered consumers' yards except on Northern foundry, high phosphorus and malleable, which are f.o.b. local furnaces, not including an average switching charge of 61c. per gross ton.

### BAR

Orders for mild steel bars, except the deformed grades used for road work, have been gradually tapering for some time, and reached a very low point just prior to the Fourth of July. Since then the number of orders and inquiries has increased, but the tonnage is light. There has been very little contracting for the third quarter. The uncertain course of business, the fact that prices are stable, and the exceptional delivery service available from mills are factors which deter buyers from making forward commitments. Farm implement manufacturers are still on a very low production basis, but reports indicate that seasonal shipments of machinery from stock have made gains.

The use of alloy steel continues to lose ground. The iron bar market is showing little life, but producers are expectant of some business from shops that have orders for refrigerator cars. Specifications for rail steel bars are in sufficient volume to hold operations in the range from 45 to 50 per cent of capacity. New buying is spotty and is not sufficient to hold backlogs at a uniform size. The barn equipment industry, which has been unable to reach its usual stride so far this year, is placing small and infrequent orders, all of which are for prompt delivery.

### RAILS AND TRACK SUPPLIES

Steel producers estimate that unspecified tonnage of rails still on books is ample to maintain rail mills at their present rate of rolling for two to three months. Releases from week to week are very light, and there seems to be no disposition on the part of the railroads to make more rapid use of their commitments.

### CAST IRON PIPE

Dullness still hangs over this market. A sewage treatment plant at North Chicago, Ill., will take 100 tons and similar work near that town will call for an additional 150 tons. Private buying, though not large, is more active than lettings on public work. For several months there has been a steady demand for culvert pipe for road programs in Illinois and surrounding States.

Prices per net ton, deliv'd Chicago: Water pipe, 6-in. and over, \$42 to \$44; 4-in., \$45 to \$47; Class A and gas pipe, \$3 extra.

### SHEETS

The new price schedule is in full effect, but deliveries will be made during July against orders taken at the old quotations, and therefore current sales are light. It may be several weeks before real tests are to be had on the new structure. Specifications are small and spotty. Hot mills are producing at 35 to 40 per cent of capacity. Tonnages being ordered out by warehouses are very light.

Base prices per lb., deliv'd from mill in Chicago: No. 24 black sheets, 2.40c. to 2.50c.; No. 24 galv., 2.95c. to 3.05c.; No. 10 blue ann'l'd, 2.00c. to 2.10c. Deliv'd prices at other Western points are equal to the freight from Gary, plus the mill prices, which are 5c. per 100 lb. lower than Chicago delivered prices.

### WAREHOUSE BUSINESS

There is a gradual upturn in size and number of orders. However, distribution by warehouses is in very small volume even for this time of year. New discounts are being announced on bolts, coach and lag screws and nuts. Machine bolts, carriage bolts and coach and lag screws



are being quoted at 60, 10 and 10 per cent off list; both square and hexagon nuts are 60, 10 and 10 off list in lots of one keg or more; at 50, 10 and 10 per cent off for less than keg lots.

## REINFORCING BARS

Some very attractive tonnages have come out for bids and additional inquiries are in sight. However, the bulk of estimating is on lots of less than 100 tons each. A large amount of bars will be needed for the Chicago Post Office, on which bids are being sought. A half dozen small post office jobs are out for figures. A nurses' home at the Cook County, Ill., hospital, the Marshall Field Estate Building and a structure for the Western Electric Co. call for an aggregate of 2500 tons. There is also in prospect a large tonnage for the Sanitary District, and more road lettings are to come. Various bar companies have been taking miscellaneous road tonnage in Wisconsin. Although June sales reached the low point of the year, prospects appear somewhat brighter for the remainder of the summer.

## BOLTS, NUTS AND RIVETS

The recent changes in discounts have had no effect in stimulating the market. Spot buying is almost at a standstill and specifications are about as low as they have been at any time this year.

## STRUCTURAL MATERIAL

Awards, at 2500 tons, are scattered over a wide territory and, as has been experienced throughout most of this year, the bulk of tonnage let is for public work. Fresh inquiries total 3500 tons, of which 2100 tons is for an addition to a telephone exchange at Indianapolis. There is still a fair sprinkling of inquiries and lettings of less than 100 tons, but, contrary to what would normally be expected, the work of this kind in Chicago is less than in outlying districts. The reason for this appears to be that within recent weeks many small banks in Chicago have closed their doors and small projects which the builders had planned to finance through these banks have had to be dropped. Some steel producers estimate that not less than 75,000 tons of structural steel is on open inquiry, but about 45,000 tons of this is for the Chicago Post Office.

## PLATES

Users of oil storage tanks in the Southwest have placed orders that will require 3000 tons of plates, and there are inquiries of large size in which fabricators are now figuring. Otherwise, the plate market is quiet. The Northern Pacific has not yet closed for the 500 underframes that it has on inquiry. There have been no noteworthy developments in the railroad equipment field since the first of the month. A car shop has placed

2000 tons of steel against a recent car order, and it is understood that negotiations are under way for sheets for steel box cars. Skelp is going to pipe mills at a rate of about 4000 tons a week, but present schedules do not extend much beyond the middle of July. Considerable interest has been created in the local plate market by reports that a survey is being made for a steel mill to be located near Milwaukee. The Dubuque Boat & Boiler Co. has a contract to build a boat that will take 300 tons of steel.

## WIRE PRODUCTS

Prices for wire products are fairly steady in a very quiet market. Probably the outstanding transaction of the week, at least in nails, was an order placed with a Chicago mill for 2000 kegs for use in 800 new refrigerator cars that are being built for a fruit express company. Orders for nails to be used in building construction are light. Demand for wire products in rural districts is almost at a standstill for the reason that farmers' interest now centers in the harvesting of July crops. Recent advances in prices for copper sharply stimulated inquiries for copper wire and cables, but only a small part of this interest was carried far enough to result in actual orders. Shipments of wire rope are light in all major lines of consumption.

## OLD MATERIAL

The holiday has had telling effect on the movement of scrap in the local market. Steel mills cut down sharply on acceptances and most of the other consumers were carrying sufficient scrap to tide over. Dealers do not seem to be able to get away from the idea that the next price movement will be upward. This opinion is strengthened by recent changes in certain markets to the east of Chi-

cago. Sentiment is turning strongly against short positions in the market and practically every broker is anxious to cover existing sales. This situation is serving to strengthen prices on trades, and there is also some evidence of stiffening in quotations to consumers. Brake shoes have moved to a consumer at an advance of 25c. Dealers do not hesitate to pay \$8.75 a gross ton, delivered, for heavy melting steel, some of which was sold to users at quotations above the present market level. The Rock Island is offering 2400 tons, and the Monon will sell 500 tons. The Michigan Central will dispose of a blank list.

Prices del'd Chicago dist. consumers:  
Per Gross Ton

Basic Open-Hearth Grades:	
Heavy melting steel.....	\$8.50 to \$9.00
Shoveling steel.....	8.50 to 9.00
Frogs, switches and guards, cut apart, and misc. rails	8.50 to 9.00
Factory hyd. comp. sheets	7.00 to 7.50
Drop forge flashings.....	6.00 to 6.50
No. 1 busheling.....	6.75 to 7.25
Forg'd cast and r'l'd steel carwheels.....	9.50 to 10.50
Railroad tires, charg. box size.....	10.50 to 11.00
Railroad leaf springs cut apart.....	11.00 to 11.50
Axle turnings.....	7.00 to 7.50

Acid Open-Hearth Grades:	
Steel couplers and knuckles	9.75 to 10.25
Coil springs.....	11.50 to 12.00

Electric Furnace Grades:	
Axle turnings.....	7.50 to 8.00
Low phos. punchings.....	10.75 to 11.25
Low phos. plates, 12 in. and under.....	10.50 to 11.00

Blast Furnace Grades:	
Cast iron borings.....	3.75 to 4.00
Short shoveling turnings..	3.50 to 4.00
Machine shop turnings....	3.50 to 4.00

Rolling Mill Grades:	
Rerolling rails.....	10.25 to 10.75

Cupola Grades:	
Steel rails, less than 3 ft..	10.50 to 11.00
Steel rails, less than 2 ft..	11.00 to 11.50
Angle bars, steel.....	9.25 to 9.75
Cast iron carwheels.....	10.00 to 10.50

Malleable Grades:	
Railroad.....	9.50 to 10.00
Agricultural.....	9.00 to 9.25

Miscellaneous:	
*Relaying rails, 56 to 60 lb.	19.00 to 21.00
*Relaying rails, 65 lb. and heavier.....	22.00 to 27.00

Per Net Ton	
Rolling Mill Grades:	
Iron angle and splice bars.	9.00 to 9.50

Iron arch bars and transoms.....	10.50 to 11.00
Iron car axles.....	17.50 to 18.50
Steel car axles.....	11.50 to 12.00
No. 1 railroad wrought....	7.00 to 7.50
No. 2 railroad wrought....	7.50 to 8.00
No. 1 busheling.....	6.00 to 6.50
No. 2 busheling.....	4.00 to 4.50
Locomotive tires, smooth..	11.50 to 12.50
Pipes and flues.....	5.50 to 6.00

Cupola Grades:	
No. 1 machinery cast.....	9.00 to 9.50
No. 1 railroad cast.....	8.00 to 8.50
No. 1 agricultural cast....	7.00 to 7.50
Stove plate.....	6.25 to 6.75
Grate bars.....	5.50 to 6.00
Brake shoes.....	5.75 to 6.25

\*Relaying rails, including angle bars to match, are quoted f.o.b. dealers' yards.



Joseph T. Ryerson & Son, Inc., Jersey City, N. J., has announced the termination on July 1 of its export agency contract with Paul H. Petersen, Inc., New York. All export machinery business is now handled by the export department of the Ryerson company.

## Warehouse Prices, f.o.b. Chicago

Base per Lb.

Plates and structural shapes.....	3.00c.
Soft steel bars.....	2.75c.
Reinforcing bars, billet steel, 1.55c. to 2.00c.	
Rail steel reinforcement—	
For buildings.....	1.45c. to 1.65c.
Highway slabs.....	1.50c.
For bridges and culverts.....	1.65c.
Cold-fin. steel bars and shafting—	
Rounds and hexagons.....	3.10c.
Flats and squares.....	3.60c.
Bands, $\frac{3}{8}$ in. (in Nos. 10 and 12 gages).....	2.95c.
Hoops (No. 14 gage and lighter) ..	3.50c.
Hot-rolled annealed sheets (No. 24) ..	3.55c.
Galv. sheets (No. 24).....	4.10c.
Hot-rolled sheets (No. 10).....	3.20c.
Spikes ( $\frac{3}{4}$ in. and larger).....	3.45c.
Track bolts.....	4.30c.
Rivets, structural.....	4.00c.
Rivets, boiler.....	4.00c.

Per Cent Off List

Machine bolts.....	60, 10 and 10
Carriage bolts.....	60, 10 and 10
Coach and lag screws.....	60, 10 and 10
Hot-pressed nuts, sq., tap. or blank,	60, 10 and 10
Hot-pressed nuts, hex., tap. or blank,	60, 10 and 10
No. 8 black ann'l'd wire, per 100 lb..	\$3.45
Com. wire nails, base per keg.....	2.30
Cement c't'd nails, base per keg.....	2.30

# CLEVELAND

## Low Point of Steel Demand Believed to Have Been Reached

CLEVELAND, July 7.—The third quarter has started with the demand for finished steel reduced to a point which many believe is the bottom. However, no uptrend is expected for a month or six weeks. With reduced production schedules and the summer shutdowns planned by some of the automobile companies, not much is expected from that industry this month. However, an increase in tonnage may come from that source during August, when automobile manufacturers will order steel for September production. Other metal-working industries are experiencing their usual seasonal lull.

With only 12 of 34 open-hearth furnaces running, a loss of two for the week, local steel plant operations have declined six points to 35 per cent of ingot capacity. The Republic Steel Corp. shut down the two furnaces that it placed in operation a few months ago at the Bourne-Fuller plant to use up raw material on hand. One other producer put on a furnace and another took a furnace off. Finishing mill operations were light during the week, some plants shutting down for a longer time than usual during the holiday period. Some of the sheet and strip mills have a little increase in tonnage on their books through late June releases at the old prices. However, so far this month the market on these products has been nearly at a standstill.

While pig iron enjoyed a little spurt the past week, makers expect the market to drift along at rather low levels for a few weeks, but believe there will be an improvement in activity in August.

Shipments of Lake ore have been curtailed to an extent that the movement until July 1 was less than in the corresponding period of 1921. There was an improvement, however, in June, with water shipments more than double those in May.

No resistance has been offered to the reestablishment of second quarter prices on bars, plates and shapes. While the higher prices on sheets and hot-strip steel as yet have not been given much of a test, no slipping from the new prices is reported, and mills feel confident that they will be maintained.

### PIG IRON

Sales gained the past week and inquiry improved slightly. One producer sold 7000 tons during the week, or more than in any previous week since last March. Most of the business was for the last quarter, although a few contracts were taken for the entire last half. Many of the foundries continue to buy in small lots as needed. Shipments by a leading producer de-

clined 12 per cent in June, compared with May, and there may be a slight further decline this month owing to the curtailed demands from the motor car industry. The use of the free wheeling equipment on motor cars has led to the substitution of cast and malleable iron brake drums by some of the makers and this is proving helpful to some of the foundries. Prices are steady at \$16 to \$17, Lake furnace, for foundry and malleable iron for Ohio and Indiana and at \$17 to \$17.50 for Michigan shipment. Southern foundry iron is firm at \$11, Birmingham.

### Prices per gross ton at Cleveland:

N'th'n fdy., sil. 1.75 to 2.25.....	\$17.00
S'th'n fdy., sil. 1.75 to 2.25.....	17.01
Malleable.....	17.50
Ohio silvery, 8 per cent.....	25.00
Stand. low phos., Valley.....	27.00

Prices are f.o.b. furnace except on Southern foundry and silvery iron. Freight rates: 50c, average local switching charge; \$3 from Jackson, Ohio; \$6.01 from Birmingham.

### IRON ORE

Shipments of Lake Superior ore during June amounted to 3,808,043 tons, a decrease of 4,842,398 tons from the same month last year. The movement by water up to July 1 was 5,753,259 tons, a decrease of 9,984,314 tons, or 63.44 per cent, from the same period last year.

### COKE

Some of the producers of Connellsville foundry coke are soliciting contracts, which include a wage clause protecting consumers from any price advance in excess of that due to any possible wage advance that might result from labor troubles. Contracts are being taken at \$4.75 for premium grades, a reduction of 10c, a ton from recent prices.

### STRIP STEEL

Consumers of hot-rolled strip specified for early needs against old contracts at the end of last month, and very little new business has been taken at the \$1 a ton price advance to 1.55c., Pittsburgh, for wide strip and

1.65c. for narrow. The higher quotations evidently are being maintained. With the dwindling demands from the motor car industry, not much new business is expected this month. Cold-rolled strip continues dull, with demand of a hand-to-mouth character. The market is steady at 2.15c., Cleveland.

### SHEETS

The market has been virtually at a standstill since June 30, the last day for ordering sheets under the old classification and at the old prices. As mills have accepted specifications at the old prices for shipment through July, very little business is expected during the next two weeks. While there have been very few orders to test the higher prices, there are no reports that the new quotations are being shaded. Specifications from the motor car industry for July have been sharply curtailed. The local Fisher body plant making Chevrolet bodies has reduced schedules. A fair tonnage is still coming from electric refrigerator manufacturers. There is a seasonal slowing down in orders for enameling stock from stove manufacturers.

### BARS, PLATES AND SHAPES

New contracts at the prices that prevailed during last quarter or renewals of old contracts have been made with most of the trade by some of the mills. Little new inquiry is coming out in the construction field requiring either structural shapes or reinforcing bars. The only sizable local job pending is the Juvenile Court Building, which will take 1100 tons of shapes. For a mooring basin in Toledo, 300 tons of sheet steel piling will be required. Sharp competition has resulted in irregularity in reinforcing bars, and concessions to 1.55c., Cleveland, in some cases have been made for new billet steel bars. Merchant bars are unchanged at 1.65c., Cleveland, for outside shipment and at 1.70c. for local delivery. Shapes and plates are 1.65c., Pittsburgh.

### WAREHOUSE BUSINESS

Jobbers have revised differentials on sheets to conform with the differentials in the new classification plan. Base prices are unchanged.

### OLD MATERIAL

Some small lots of steel-making scrap are being purchased by dealers to fill orders with Valley district mills, which continue to take scrap in limited volume. A Cleveland mill has shut off shipments of blast furnace scrap. As low as \$4.25 is reported to have been paid for machine shop turnings for Valley district delivery. (Concluded on page 144)

### Warehouse Prices, f.o.b. Cleveland

	Base per Lb.
Plates and struc. shapes.....	2.95c.
Soft steel bars.....	2.75c.
Reinforc. steel bars.....	1.75c. to 1.95c.
Cold-fin. rounds and hex.....	3.10c.
Cold-fin. flats and sq.....	3.60c.
Hoops and bands, No. 12 to 1/4 in., inclusive.....	3.00c.
Hoops and bands, No. 13 and lighter.....	3.55c.
Cold-finished strip.....	5.55c.
Hot-rolled annealed sheets (No. 24).....	3.60c.
Galvanized sheets (No. 24).....	4.00c.
Hot-rolled sheets (No. 10).....	3.00c.
No. 9 ann'l'd wire, per 100 lb.....	\$2.25
No. 9 galv. wire, per 100 lb.....	2.70
Com. wire nails, base per keg.....	2.10

\*Net base, including boxing and cutting to length.



# NEW YORK

## Pig Iron Sales Increase—Steel Buying Unimproved

NEW YORK, July 7.—Pig iron inquiry is limited to about 1500 tons, mostly small lots for special requirements. Sales for the week aggregated 7600 tons, the largest reported since the last week in March. Some third quarter buying is evident, but the major portion of the tonnage placed is for barge delivery to start in the near future. The Thatcher Co. is reported to have purchased only 2000 tons of No. 2 iron for its Garwood, N. J., plant, dividing the tonnage among four interests, including makers in eastern Pennsylvania and Buffalo districts.

Foundry operations for July are expected to reflect a low rate for the year, in view of a number of shut-downs of from one to three weeks.

Prices per gross ton, delivered New York district:

Buffalo No. 2 fdy., sil.	1.75
to 2.25	\$19.91 to \$20.41
*Buff. No. 2, del'd east.	
N. J.	18.28 to 18.78
East. Pa. No. 2 fdy., sil.	1.75 to 2.25
to 2.25	17.39 to 17.89
East. Pa. No. 2X fdy., sil.	2.25 to 2.75
to 2.75	17.89 to 18.39

Freight rates: \$4.91 from Buffalo, \$1.39 to \$2.52 from eastern Pennsylvania.

\*Prices delivered to New Jersey cities having rate of \$3.28 a ton from Buffalo.

### FINISHED STEEL

Although the better sentiment resulting from the successful outcome of international debt negotiations may ultimately become a definite market factor, there has been no effect as yet upon orders for steel, nor does the trade expect that there will be until seasonal influences, which are making July an exceedingly poor month, are out of the way. There was a fair gain in orders for sheets during the last two or three days of June, but this was due entirely to the fact that higher prices went into effect as of July 1. It was not noticeable, however, that many consumers or jobbers covered for more than a month's requirements, and the shipments against these orders up to the end of July will not take care of much of the August consumption. The new sheet prices have scarcely had a test and probably will not have for at least two or three weeks. Meanwhile, the apparently staunch attitude of the sheet producers is having a wholesome effect on the general competitive situation in all products. Prices are more stable than at any time in months.

### CAST IRON PIPE

Interest in pressure pipe is confined to small lots. Public utilities are reported to be feeling out the market for last half requirements, but no outstanding inquiries are in evidence. Several small jobs, involving about 400 tons of 18, 20 and 24-in. pipe for State and county highways in New

Jersey, have been let to contractors, but orders for the pipe have not been placed with the makers. City of New York awarded 500 tons of 12-in., and Ridgewood, N. J., placed 125 tons of small sizes, both contracts going to Warren Foundry & Pipe Corp.

Prices per net ton delivered New York: Water pipe, 6-in. and larger, \$32.90; 4-in. and 5-in., \$35.90; 3-in., \$42.90. Class A and gas pipe, \$3 extra.

### REINFORCING BARS

Distributors are generally quoting billet steel bars at 1.65c., Pittsburgh, or 1.98c., New York, but this price applies only on orders for less than a carload. Medium-sized tonnages of bars are usually placed at 1.60c., Pittsburgh, or 1.93c., New York, and the larger contracts bring concessions of \$1 and \$2 a ton. The largest reinforced concrete project in this district is a sewage disposal plant for Elizabeth, N. J., requiring about 1500 tons of reinforcing bars. A laundry building in the Borough of Bronx calls for 200 tons.

### OLD MATERIAL

Prices are generally unchanged, but brokers note increasing resistance among holders of scrap to sales at the present level of prices, attributed to improved sentiment in business. A railroad, which offers a list of scrap every month, states that on its most recent opening of bids offers were slightly higher than in some months, and there was a larger number of bidders, including certain consumers

who had failed to bid for scrap for six months to a year. No. 1 heavy melting steel is being shipped by barge to Buffalo at \$6.25, on barge, New York, and a small tonnage is being shipped to a Claymont, Del., consumer. Brokers are offering \$5 a ton for blast furnace scrap, delivered to Swedeland, Pa., and a consumer at Coatesville, Pa., has closed on about 500 tons of heavy breakable cast at \$9.50 a ton, delivered.

Dealers' buying prices per gross ton, f.o.b. New York:

No. 1 heavy melting steel..	\$4.50 to \$6.25
Heavy melting steel (yard)	3.00 to 3.50
No. 1 hvy. breakable cast..	5.50 to 6.00
Stove plate (steel works)...	3.75 to 4.00
Locomotive grate bars....	3.75 to 4.00
Machine shop turnings....	2.00
Short shoveling turnings...	2.00
Cast borings (blast fur. or steel works).....	2.25
Mixed borings and turnings .....	1.75 to 2.00
Steel car axles.....	12.00 to 12.50
Iron car axles.....	16.50 to 17.00
Iron and steel pipe (1 in. dia., not under 2 ft. long)	6.00 to 6.25
Forge fire.....	4.50
No. 1 railroad wrought....	8.25
No. 1 yard wrought, long...	7.25
Rails for rolling.....	6.00 to 6.50
Stove plate (foundry)....	4.25 to 4.50
Malleable cast (railroad)...	7.50 to 8.00
Cast borings (chemical)...	8.00 to 8.50

Prices per gross ton, deliv'd local foundries:

No. 1 machry. cast.....	\$11.50 to \$12.00
No. 1 hvy. cast (columns, bldg. materials, etc.; cupola size) .....	9.50 to 10.00
No. 2 cast (radiators, cast boilers, etc.).....	8.50 to 9.00

## Cleveland Iron and Steel Market

(Concluded from page 143)

Dealers are paying \$10 to \$10.25 for heavy melting steel and \$6.75 to \$7 for No. 1 busheling for Valley shipment. Prices on blast furnace grades have declined 25c. a ton.

Prices per gross ton delivered consumers' yards:

Basic Open-Hearth Grades:	
No. 1 heavy melting steel..	\$8.50 to \$9.00
No. 2 heavy melting steel..	8.00 to 8.50
Compressed sheet steel...	7.50 to 8.00
Light bundled sheet stampings .....	6.50 to 7.00
Drop forge flashings.....	6.75 to 7.00
Machine-shop turnings....	5.00 to 5.50
Short shoveling turnings...	6.25 to 6.75
No. 1 railroad wrought....	9.50 to 10.00
No. 2 railroad wrought....	10.00 to 10.50
No. 1 busheling.....	6.75 to 7.00
Pipes and flues.....	5.50 to 6.00
Steel axle turnings.....	7.50 to 8.00

Acid Open-Hearth Grades:

Low phos., billet bloom and slab crops.....	14.00 to 14.50
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Blast Furnace Grades:

Cast iron borings.....	6.00 to 6.25
Mixed borings and short turnings .....	6.00 to 6.25
No. 2 busheling.....	5.75

Cupola Grades:

No. 1 cast.....	10.00 to 10.50
Railroad grate bars.....	6.00 to 6.50
Stove plate.....	6.00 to 6.50
Rails under 3 ft.....	15.00 to 15.50

Miscellaneous:

Rails for rolling.....	13.00 to 13.50
Railroad malleable .....	11.00 to 11.25



# PHILADELPHIA

## Fair-Sized Plate Orders Pending— 5000 Tons of Basic Iron Bought

**P**HILADELPHIA, July 7.—Steel buying was adversely affected by the holiday, but practically all eastern Pennsylvania mills resumed operations after the week-end, continuing at an average of about 35 per cent of capacity. The usual number of small orders was received by most mills immediately after the holiday. Plate mills are quoting on some desirable contracts, but have only a small tonnage of business on their books.

Decision is expected this week on a gas holder for the United Gas Improvement Co., Philadelphia, and there is a possibility that the company may contract for two, each requiring about 3000 tons of plates and 1000 tons of shapes. The Atlantic Refining Co. is expected to place 12 oil storage tanks, requiring about 500 tons of plates. The Panama Canal Commission, Washington, opens bids July 23 on material for the canal, including a small tonnage of shapes, about 100 tons of flat, hexagon and round steel bars and 45,000 ft. of wrought iron or steel pipe.

### PIG IRON

A Claymont, Del., consumer of basic pig iron has placed about 5000 tons with three eastern Pennsylvania producers. Basic iron is quotable at about \$16 a ton, furnace, or \$16.75 a ton, delivered. Transactions in foundry iron are limited to lots of one or two carloads for prompt shipment at \$16.25 to \$16.50, furnace. Southern foundry iron is still quoted at \$11 a ton, Birmingham, or \$16.25 a ton, on dock, Philadelphia. Current inquiry includes a carload of No. 2 foundry iron for the Panama Canal Commission, Washington, bids to be opened July 23.

#### Prices per gross ton at Philadelphia:

East. Pa. No. 2, 1.75 to 2.25 sil.	\$17.01 to \$17.26
East. Pa. No. 2X, 2.25 to 2.75 sil.	17.51 to 17.76
East. Pa. No. 1X, 2.25 to 2.75 sil.	18.01 to 18.26
Basic (del'd east. Pa.)	16.75
Malleable	19.00 to 20.00
Stand. low phos. (f.o.b. east. Pa. furnace)	23.00 to 24.00
Cop. b'r'g low phos. (f.o.b. furnace)	22.00 to 23.00
Va. No. 2 plain, 1.75 to 2.25 sil.	22.29
Va. No. 2X, 2.25 to 2.75 sil.	22.79

Prices, except as specified otherwise, are deliv'd Philadelphia. Freight rates: 76c. to \$1.64 from eastern Pennsylvania furnaces; \$4.54 from Virginia furnaces.

### STEEL BARS

The price is unchanged at 1.65c., Pittsburgh, or 1.94c., delivered Philadelphia, with 1.60c., Pittsburgh, or 1.89c., Philadelphia, applying on specifications against some contracts, which have been extended from the second quarter. Billet steel reinforcing bars

range from 1.60c. to 1.65c., Pittsburgh, or 1.89c. to 1.94c., Philadelphia. The lower quotation applies on lots of a carload to 100 tons and concessions of \$1 and \$2 a ton are granted on the larger tonnages. Rail steel bars are quoted at 1.20c. to 1.30c. a lb., Pittsburgh, or 1.49c. to 1.59c., Philadelphia. The general contractor for grade crossing elimination work on the Reading Railroad's Germantown-Chestnut Hill line, requiring 296 tons of bars, is the James McGraw Co., Philadelphia.

### PLATES

Tank fabricators are bidding on a number of desirable contracts, some of which may result in plate tonnages for eastern Pennsylvania mills. Actual orders on mill books, however, are small, and operating rates are in most cases well under 40 per cent. Quotations are unchanged at 1.70c. to 1.75c. a lb., Coatesville, Pa., or 1.80½c. to 1.85½c., Philadelphia.

### SHAPES

Fabricating shops have few contracts on their books, and, as a result, requirements are small and usually for immediate delivery, which is bringing increased activity in truck deliveries of small lots from the mills. Prices are unchanged at 1.70c. to 1.75c. a lb., f.o.b. nearest mill to consumer, or 1.76c. to 1.81c., Philadelphia, with occasional concessions to 1.65c., mill, or 1.71c., Philadelphia, on the larger lots.

### SHEETS

Although all sheet sellers are quoting on the new classification and bases, there has been no test of the new prices even for a small lot, as consumers are still receiving deliveries of material brought on the former

bases. In the week prior to July 1, consumers were covered in their immediate sheet requirements at concessions.

### IMPORTS

In the week ended July 3, arrivals at this port consisted of 401 tons of steel bars, 48 tons of structural shapes and 10 tons of steel bands from Belgium, and nine tons of bearing tubing and six tons of steel bars from Sweden.

### OLD MATERIAL

Transactions in scrap are mostly sales of distress carloads of various grades. Brokers are buying small tonnages of machine shop turnings, stove plate and No. 2 heavy melting steel to complete contracts with eastern Pennsylvania consumers. A small contract for No. 1 blast furnace scrap has been made at \$5.50 a ton, delivered to an eastern Pennsylvania user.

#### Prices per gross ton delivered consumers' yards, Philadelphia district:

No. 1 heavy melting steel	\$8.00 to \$9.00
No. 2 heavy melting steel	7.00
Heavy melting steel (yard)	6.50
No. 1 railroad wrought	10.00 to 10.50
Bundled sheets (for steel works)	6.50
Hydraulic compressed, new	7.00 to 8.00
Hydraulic compressed, old	6.00 to 6.50
Machine shop turnings (for steel works)	5.00 to 6.00
Heavy axle turnings (or equiv.)	8.00 to 8.50
Cast borings (for steel works and roll. mill)	5.00 to 6.00
Heavy breakable cast (for steel works)	9.50 to 10.00
Railroad grate bars	8.00
Stove plate (for steel works)	8.00
No. 1 low phos., hvy. (0.04% and under)	12.00 to 13.00
Couplers and knuckles	11.00 to 11.50
Roller steel wheels	10.00 to 11.00
No. 1 blast furnace	5.50
Wrot. iron and soft steel pipe and tubes (new specific)	11.00 to 11.50
Shafting	16.50 to 17.00
Steel axles	16.00 to 16.50
No. 1 forge fire	8.00 to 8.50
Cast iron carwheels	12.00 to 12.50
No. 1 cast	11.00 to 11.50
Cast borings (for chem. plant)	12.00 to 12.50
Steel rails for rolling	10.50 to 11.00

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## Public Works Contracts \$38,575,078 in Week

WASHINGTON, July 7.—Contracts totaling \$38,575,078 were awarded last week for public and semi-public works projects, according to reports to the Public Works Section of the President's Emergency Committee for Employment. Awards since Dec. 1 aggregate \$1,848,166,868.

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Cement-Gun Construction Co., Chicago, has removed its New York office to 1169-1171 Woolworth Building.

# BOSTON

Pig Iron Sales 2000 Tons—Scrap Almost at Standstill

**B**OSTON, July 7.—Pig iron sales the past week approximated 2000 tons, of which the Mystic Iron Works booked nearly three-quarters. Sales included about 400 tons of Indian iron at prices ranging from \$18.25 to \$19.50 a ton, on dock here, duty paid. There are no open inquiries in the market, current sales being a matter of personal solicitation by furnace representatives.

Foundry iron prices per gross ton deliv'd to most New England points:

*Buffalo, sil. 1.75 to 2.25..	\$19.91 to \$20.91
*Buffalo, sil. 2.25 to 2.75..	19.91 to 20.91
†Buffalo, sil. 1.75 to 2.25..	19.28 to 20.28
†Buffalo, sil. 2.25 to 2.75..	19.28 to 20.28
*Ala., sil. 1.75 to 2.25..	20.11 to 20.61
*Ala., sil. 2.25 to 2.75..	20.61 to 21.11
†Ala., sil. 1.75 to 2.25..	16.75
†Ala., sil. 2.25 to 2.75..	17.25

Freight rates: \$4.91 all rail from Buffalo; \$9.61 all rail from Alabama and \$5.75 rail and water from Alabama to New England seaboard.

\*All rail rate.

†Rail and water rate.

## CAST IRON PIPE

The Warren Foundry & Pipe Co. has sold 900 tons of 16-in. pipe to Hanover, N. H., and 100 tons of 12-in. to Rockport, Mass. Nashua, N. H., has closed bids on 150 tons, and West Springfield, Mass., on 100 tons, and will make awards this week. Business otherwise is confined to small lots for prompt shipments. Prices are still soft, with \$32 a ton, on cars foundry, the average asking price for Class B pipe.

## FABRICATED STEEL

No awards of importance were made the past week, and new business did not exceed 1000 tons. Steel required for section B of the East Bos-

ton tunnel, now being figured, includes 325 tons of shapes, 250 tons of reinforcing bars, 5000 ft. of steel pipe and 12,000 ft. of wire mesh. Cambridge, Mass., has tentative plans for a pipe line between that city and Waltham, Mass., which will require approximately 13,000 ft. of 36-in. welded pipe.

## WAREHOUSE BUSINESS

Common carriage and machine bolts and lag screws are now 65 and 5 per cent off the list, contrasted with 60 and 5 per cent heretofore. All kinds of nuts are 40 and 10 per cent off the list, as against 40 per cent formerly, while wire nails have been reduced 15c. a keg to \$2.85, base, from stock. The discount on the wood screw list is now 40 and 25 per cent, whereas it was 40 and 10 per cent. The change in bolts, lag screws and nuts is the first in many months. The volume of weekly shipments of individual warehouses compares favorably with a year ago, but individual buying is in small quantities and competition among warehouses is keen. Stocks are comparatively small and generally not well balanced.

## OLD MATERIAL

Business was virtually at a standstill the past week, having been confined almost exclusively to scattered car lot sales to the American Steel & Wire Co., Worcester, Mass., mostly bundled skeleton. The improvement in prices in other sections of the country is not reflected here for the reason that brokers have practically no orders to fill. Although the general New England industrial situation is slowly improving, the quantity of scrap being produced is negligible.

Buying prices per gross ton, f.o.b. Boston rate shipping points:

No. 1 heavy melting steel..	\$4.00 to \$4.25
Scrap T rails.....	4.00 to 4.25
Scrap girder rails.....	3.00 to 3.25
No. 1 railroad wrought...	7.00 to 7.50
Machine shop turnings...	0.60 to 0.80
Cast iron borings (steel works and rolling mill)	0.60 to 1.00
Bundled skeleton, long....	3.00 to 3.25
Forged flashings .....	5.00 to 5.25
Blast furnace borings and turnings .....	1.00
Forge scrap .....	0.50 to 0.80
Shafting .....	10.00 to 10.50
Steel car axles .....	11.00 to 12.00
Wrought pipe, 1 in. in diameter (over 2 ft. long)	5.00 to 5.25
Rails for rolling.....	7.50 to 8.00
Cast iron borings, chemical	7.00 to 7.25
No. 2 cast.....	5.00 to 5.25

Prices per gross ton deliv'd consumers' yards:

Textile cast .....	\$9.50 to \$10.00
No. 1 machinery cast....	9.50 to 10.00
Stove plate .....	5.00 to 5.25
Railroad malleable.....	13.00 to 13.50

# CINCINNATI

Orders for Sheets Gain Moderately—Other Lines Very Dull

**C**INCINNATI, July 7.—There was a recession in pig iron demand the past week. Sales were about a third less than in the preceding week, furnace representatives accounting for only 975 tons, all of which was sold in small quantities to care for the immediate needs of district melt-

ers.

Prices per gross ton, deliv'd Cincinnati:

Ala. fdy., sil. 1.75 to 2.25.....	\$14.69
Ala. fdy., sil. 2.25 to 2.75.....	15.19
Tenn. fdy., sil. 1.75 to 2.25.....	14.69
S't'n Ohio silvery, 8 per cent.....	23.89

Freight rates, \$1.89 from Ironton and Jackson, Ohio; \$3.69 from Birmingham.

## COKE

Prices on by-product foundry coke will continue at about \$9, delivered in Cincinnati, during July.

## FINISHED STEEL

As the result of the last-minute rush of consumers of sheets to cover before the date of new price schedules set for July 1, bookings of district sheet mills gained last week. Sheet mills report that operations this week will be just slightly under 50 per cent of capacity.

## OLD MATERIAL

The scrap market continues to experience a slow movement both of new business and shipments on old commitments. Prices still have an undertone of softness. The Chesapeake

& Ohio and Norfolk & Western Railroads are offering their usual lists.

Dealers' buying prices per gross ton, f.o.b. cars, Cincinnati:

Heavy melting steel.....	\$7.25 to \$7.75
Scrap rails for melting....	10.25 to 10.75
Loose sheet clipping.....	3.50 to 4.00
Bundled sheets .....	6.75 to 7.25
Cast iron borings .....	3.75 to 4.25
Machine shop turnings....	4.00 to 4.50
No. 1 busheling .....	5.75 to 6.25
No. 2 busheling .....	3.75 to 4.25
Rails for rolling .....	11.00 to 11.50
No. 1 locomotive tires....	9.50 to 10.00
No. 2 railroad wrought....	7.25 to 7.75
Short rails .....	13.00 to 13.50
Cast iron carwheels .....	10.50 to 11.00
No. 1 machinery cast....	12.50 to 13.00
No. 1 railroad cast.....	11.50 to 12.00
Burnt cast .....	5.25 to 5.75
Stove plate .....	5.25 to 5.75
Brake shoes .....	5.25 to 5.75
Agricultural malleable....	10.00 to 10.50
Railroad malleable .....	11.00 to 11.50

## Warehouse Prices, f.o.b. Cincinnati

Base per Lb.	
Plates and struc. shapes.....	3.25c.
Bars, soft steel or iron.....	3.00c.
New billet reinforce. bars.....	3.00c.
Rail steel reinforce. bars.....	3.00c.
Hoops .....	3.90c.
Bands .....	3.20c.
Cold-fin. rounds and hex.....	3.50c.
Squares .....	4.00c.
Hot-rolled annealed sheets (No. 24)	3.75c.
Galv. sheets (No. 24).....	4.25c.
Hot-rolled sheets (No. 10).....	3.30c.
Structural rivets .....	4.20c.
Small rivets.....	60 per cent off list
No. 9 ann'd wire, per 100 lb....	\$3.00
Com. wire nails, base per keg (25 kegs or more)	2.95
Cement c'd nails, base 100 lb. keg	2.95
Chain, per 100 lb.....	10.25
Net per 100 Ft.	
Lap-welded steel boiler tubes, 2-in..	\$16.50
4-in. ....	34.50
Seamless steel boiler tubes, 2-in..	17.50
4-in. ....	36.00

## Warehouse Prices, f.o.b. Boston

Base per Lb.	
Plates .....	3.36½c.
Structural shapes—	
Angles and beams.....	3.36½c.
Tees .....	3.36½c.
Zees .....	3.36½c.
Soft steel bars, small shapes....	3.26½c.
Reinforcing bars.....	3.11½c. to 3.26½c.
Iron bars—	
Refined .....	3.26½c.
Best refined.....	4.60c.
Norway rounds .....	6.60c.
Norway squares and flats.....	7.10c.
Spring steel—	
Open-hearth .....	5.00c. to 10.00c.
Crucible .....	12.00c.
Tire steel .....	4.50c. to 5.75c.
Bands .....	4.015c. to 5.00c.
Hoop steel .....	5.50c. to 6.00c.
Cold-rolled steel—	
Rounds and hex....	3.50c. to 5.50c.
Squares and flats....	4.00c. to 6.00c.
Toe calk steel.....	6.00c.
Rivets, structural or boiler.....	4.80c.
Per Cent Off List	
Machine bolts .....	65 and 5
Carriage bolts .....	65 and 5
Lag screws .....	65 and 5
Hot-pressed nuts .....	40 and 10
Cold-punched nuts .....	40 and 10
Stove bolts .....	70 and 10



# ST. LOUIS

Holiday and Heat Affect Pig Iron Sales—  
Business Generally Light

ST. LOUIS, July 7.—The pig iron trade was extremely dull during the last week, with the usual holiday inertia and the extreme heat as contributing factors. The little business done was in carload lots for prompt shipment. Buying, having been on the hand-to-mouth basis during the first and second quarters, the carry-over of pig iron into the third quarter is said to be very small. Prices for third quarter are unchanged, and are said to be firm, although not enough business is being offered to give the market a real test. Shipments of the local maker for June were equal to those of May.

## Prices per gross ton at St. Louis:

No. 2 fdy., sil. 1.75 to 2.25, f.o.b.	
Granite City, Ill.	\$17.50
Malleable, f.o.b. Granite City	17.50
N'th'n No. 2 fdy., deliv'd St. Louis	19.66
Southern No. 2 fdy., deliv'd	15.42
Northern malleable, deliv'd	19.66
Northern basic, deliv'd	19.66

Freight rates: 75c. (average) Granite City to St. Louis; \$2.16 from Chicago; \$4.42 from Birmingham.

## FINISHED STEEL

The most interesting development of the week was the arrival of 600 tons of sheet steel by barge from Weirton Steel Co., Weirton, W. Va., consigned to the Schlueter Mfg. Co. and the announcement that regular monthly barge movements are planned. Buying of plates, shapes and bars continues light. Prices on these items have been reaffirmed for the third quarter.

The St. Louis Structural Steel Co. was awarded 115 tons of structural for two bridge spans for the Missouri Highway Commission.

The Manufacturers' Railway bought a small tonnage of rails from a Chicago mill.

## OLD MATERIAL

The only activity of the week was a purchase of rails and specialties by an East Side consumer, some grades at the prices which prevailed on a previous transaction and others at lower prices. Movement of scrap from the

country yards amounts to almost nothing, but railroad lists have been heavy. Operations in the district yards have been at a minimum on account of the heat. Prices are unchanged except on steel rails less than 3 ft., which are 50c. lower.

Railroad lists: Baltimore & Ohio, 7755 tons; Missouri-Kansas-Texas, 500 tons; Chicago, Rock Island & Pacific, 53 carloads; Chicago, Indianapolis & Louisville, 10 carloads; St. Louis Southwestern, five carloads.

## Dealers' buying prices per gross ton, f.o.b. St. Louis district:

Selected heavy melting steel	\$8.25 to \$8.75
No. 1 heavy melting or shoveling steel	8.00 to 8.50

No. 2 heavy melting or shoveling steel	7.25 to 7.75
No. 1 locomotive tires	10.00 to 10.50
Misc. stand.-sec. rails including frogs, switches and guards, cut apart	9.25 to 9.75
Railroad springs	10.00 to 10.50
Bundled sheets	6.00 to 6.50
No. 2 railroad wrought	8.00 to 8.50
No. 1 busheling	6.00 to 6.50
Cast iron borings and shoveling turnings	5.00 to 5.50
Iron rails	8.00 to 8.50
Rails for rolling	10.50 to 11.00
Machine shop turnings	2.75 to 3.25
Heavy turnings	6.00 to 6.50
Steel car axles	13.50 to 14.00
Iron car axles	17.50 to 18.00
Wrot. iron bars and trans.	8.75 to 9.25
No. 1 railroad wrought	5.50 to 6.00
Steel rails, less than 3 ft.	10.50 to 11.00
Steel angle bars	8.50 to 9.00
Cast iron carwheels	7.00 to 7.50
No. 1 machinery cast	8.00 to 8.50
Railroad malleable	8.00 to 8.50
No. 1 railroad cast	8.00 to 8.50
Stove plate	7.00 to 7.50
Relay, rails, 60 lb. and under	16.00 to 16.50
Relay, rails, 70 lb. and over	20.00 to 21.00
Agricult. malleable	7.50 to 8.00

# BUFFALO Steel Operations Lower—Better Tone in Pig Iron Market

BUFFALO, July 7.—Buffalo producers detect a little better tone in the market, with some buying to the East and in a lesser degree in this district. Most of the Buffalo furnaces will not go lower than \$15.50 and \$16 on Eastern business, although it is reported that at least one furnace has cut to \$15. One lot of 300 tons of No. 2X for a Bath, Me., melter was offered at \$14.75, but was declined by Buffalo producers. Bethlehem Steel Co. will place another furnace in blast this week. This is the stack which was blown out for repairs a month ago.

## Prices per gross ton, f.o.b. furnace:

No. 2 fdy., sil. 1.75 to 2.25	\$17.00
No. 2X fdy., sil. 2.25 to 2.75	17.50
No. 1 fdy., sil. 2.75 to 3.25	18.50
Malleable, sil. up to 2.25	17.50
Basic	17.00
Lake Superior charcoal	25.28

## FINISHED STEEL

The Republic Steel Corp. closed its Buffalo plant over the holiday and was due to resume operations this week with one open-hearth in place of the four which had been operating last week. This degree of operation will probably continue till more bar tonnage is accumulated. Bar mills at this plant are operating at about 30 per cent. The Lackawanna plant of the Bethlehem continues to operate 10 open-hearths. Other operation in the district is unchanged. Three hundred tons of structural steel for the new East Aurora high school has been awarded. Other structural business is slow. This applies also to reinforcing bars.

## OLD MATERIAL

Two Buffalo dealers took orders from the leading consumer of scrap in the district at \$9 for No. 1 heavy melting steel and \$7.50 for No. 2 heavy melting steel. As of July 1,

this consumer canceled all unfilled tonnages for cast iron borings. In view of the dearth of buying, most of the prices quoted are nominal.

## Prices per gross ton, f.o.b. Buffalo consumers' plants:

Basic Open-Hearth Grades:	
No. 1 heavy melting steel	\$9.00 to \$9.50
No. 2 heavy melting scrap	7.50 to 8.00
Scrap rails	10.00 to 10.50
Hydraul. comp. sheets	7.50 to 8.00
No. 2 hydraul. comp. sheets	7.00 to 7.50
Hand bundled sheets	7.00
Drop forge flashings	7.50 to 8.00
No. 1 busheling	7.50 to 8.00
Hvy. steel axle turnings	8.50 to 9.50
Machine shop turnings	4.50 to 5.00
No. 1 railroad wrought	7.50 to 8.00
Acid Open-Hearth Grades:	
Kruckles and couplers	12.00 to 12.50
Coil and leaf springs	12.00 to 12.50
Rolled steel wheels	12.00 to 12.50
Low phos. billet and bloom ends	13.00 to 14.00
Electric Furnace Grades:	
Short shov. steel turnings	6.00 to 6.50
Blast Furnace Grades:	
Short mixed borings and turnings	6.00 to 6.50
Cast iron borings	6.00 to 6.50
No. 2 busheling	4.50 to 5.00
Rolling Mill Grades:	
Steel car axles	15.00 to 15.50
Iron axles	16.00 to 16.50
Cupola Grades:	
No. 1 machinery cast	10.00 to 10.50
Stove plate	8.00 to 8.25
Locomotive grate bars	7.00 to 7.50
Steel rails, 3 ft. and under	13.00 to 13.50
Cast iron carwheels	11.50 to 12.00
Malleable Grades:	
Industrial	10.00 to 10.50
Railroad	10.00 to 10.50
Agricultural	10.00 to 10.50
Special Grades:	
Chemical borings	9.00 to 9.50

## Warehouse Prices, f.o.b. Buffalo

Base per Lb.	
Plates and struc. shapes	3.25c.
Soft steel bars	3.00c.
Reinforcing bars	2.65c.
Cold-fin. flats and sq.	3.65c.
Rounds and hex.	3.15c.
Cold-rolled strip steel	5.25c.
Hot-rolled annealed sheets (No. 24)	3.70c.
Galv. sheets (No. 24)	4.10c.
Bars	3.35c.
Hoops	3.90c.
Hot-rolled sheets (No. 10)	3.50c.
Com. wire nails, base per keg	\$2.60
Black wire, base per 100 lb.	3.20

## Warehouse Prices, f.o.b. St. Louis

Base per Lb.	
Plates and struc. shapes	3.15c.
Bars, soft steel or iron	3.00c.
Cold-fin. rounds, shafting, screw stock	3.35c.
Hot-rolled annealed sheets (No. 24)	3.80c.
Galv. sheets (No. 24)	4.35c.
Hot-rolled sheets (No. 10)	3.45c.
Black corrug. sheets (No. 24)	3.85c.
Galv. corrug. sheets	4.40c.
Structural rivets	4.15c.
Boiler rivets	4.15c.
Per Cent Off List	
Tank rivets, 7/8-in. and smaller, 100 lb. or more	65
Less than 100 lb.	60
Machine bolts	60 and 10
Carriage bolts	60 and 10
Lag screws	60 and 10
Hot-pressed nuts, sq., blank or tapped, 200 lb. or more	60 and 10
Less than 200 lb.	50 and 10
Hot-pressed nuts, hex., blank or tapped, 200 lb. or more	60 and 10
Less than 200 lb.	50 and 10



## BIRMINGHAM

### Cast Iron Pipe Prospects More Promising— Pig Iron Dull

**BIRMINGHAM, July 7.**—The pig iron market has not yet been affected to any appreciable extent by the advent of the third quarter. With no immediate business improvement in prospect, there has been no incentive to place forward tonnage. Melters can secure the same quotations for spot business as for contract tonnage, and the smaller ones do not care to buy in advance. Prompt shipments make possible minimum yard stocks for the average foundry. Even the larger foundries are buying closely and not ordering out excess tonnage. There was a considerable carryover of contract tonnage, some of which had been on the books since the third and fourth quarter of last year. Pipe plants are sustaining the melt to a large extent, as other industries have made decisive curtailments in their operations. June was a very unsatisfactory month for shipments, and July to date has shown no improvement. Two merchant companies are piling iron, while a third has slowed up its furnace operations, keeping production equal to shipments. Quotations for district tonnage remain at \$12 to \$13. Twelve furnaces continue in operation, the same as for the past four weeks. On June 29, the Tennessee company changed Ensley No. 5 furnace from foundry to spiegel. On July 1 the Woodward Iron Co. changed its Woodward No. 2 from basic to foundry.

*Prices per gross ton, f.o.b. Birmingham dist. furnaces:*  
No. 2 fdy., 1.75 to 2.25 sil. \$12.00 to \$13.00  
No. 1 fdy., 2.25 to 2.75 sil. 12.50 to 13.50  
Basic ..... 12.00 to 13.00

### CAST IRON PIPE

Inquiries, bids pending and plans for new projects indicate an improvement in market conditions this month, and local manufacturers have hope of securing some good tonnage. There will be an increase in Pacific Coast business during July, but the competition for this is expected to be keen. Plants on the Eastern Seaboard and adjacent to the Delaware River, with a freight rate advantage of \$2 a ton, have been making a strong bid for Pacific Coast tonnage. Plant operations are unchanged, still being at a rate of approximately 50 per cent. American Cast Iron Pipe Co. has booked 800 tons from San Bernardino, Cal., and 500 tons from Morgantown, W. Va. Among new orders of the McWane Cast Iron Pipe Co. are 1500 ft. from Collyer, Kan., 5000 ft. from Beaumont, Tex., 8000 ft. from Beloit, Iowa, and 12,000 ft. from Fairfield, Cal. Quotations continue largely on a \$35 to \$36 base.

### FINISHED STEEL

New sheet tonnage is somewhat better than usual for this time of the year, due to the price advances an-

nounced for third quarter. All deliveries beyond July 31 carry the new prices. As the month closed there was a fair demand, and this new tonnage will improve shipments to some extent this month. Plate demand is rather quiet, due to the absence of any activity in the oil tank industry in this section. New business in bars and structural shapes continues only moderate. Active open-hearths number twelve, the Tennessee company operating 10 and the Gulf States Steel

Co. two. This is practically the same rate as for the past two weeks.

### OLD MATERIAL

There is not much change in the scrap market. New business is light and shipments lag.

*Prices per gross ton deliv'd Birmingham dist. consumers' yards:*  
Heavy melting steel..... \$9.50 to \$10.00  
Scrap steel rails ..... 10.00  
Short shoveling turnings.. 7.50  
Cast iron borings..... (No market)  
Stove plate ..... 7.00  
Steel axles ..... 15.00 to 16.00  
Iron axles ..... 18.00  
No. 1 railroad wrought... 8.00  
Rails for rolling..... 11.50 to 12.00  
No. 1 cast ..... 9.00  
Tramcar wheels ..... 10.00 to 10.25  
Cast iron borings, chem... 13.50

## YOUNGSTOWN

### Curtailment in Steel Operations Less Drastic Than Was Expected

**YOUNGSTOWN, July 6.**—While the steel industry is in its usual summer slump, curtailment in operations and demand has not been so great as was freely anticipated about a month ago. Following a rather general cessation in activity over the holiday week-end, open-hearth operations are being resumed this week at around the 35 per cent level which prevailed during the latter part of June. Steel making activity has been completely suspended at only one of the major plants in the district, and this loss of activity is partially made up by higher operations at another plant operated by the same company. At the same time Bessemer steel production is well maintained, and some companies are running at a better percentage rate on this type of steel than on open-hearth material. In one or two cases raw steel is being accumulated, and, with nine blast furnaces operating in the Valley, surplus pig iron is slowly piling up.

Raw steel production is being supported to a large extent by its requirements of pipe mills, although heavier specifications for sheets and strip steel at the end of the quarter promise a better operation for mills making these products in the next two weeks. Production at the Warren tin mill is also well maintained, and shipments during June were at a record rate. With heavy releases from the larger container manufacturers, tin mill activity will certainly be maintained during the first half of July. Production of bars is still contracting, largely because of the lower requirements of the automobile industry, but general demand is fair and as has been the case with sheets and strip, the large number of small orders has been very encouraging.

Pipe-making activity is confined largely to line pipe projects, with smaller feeder lines helping to fill out operating schedules. No large awards

have been reported in the last week, but Youngstown mills are quoting on two or three projects which may bring additional tonnage to the Valleys during the month. Demand for butt-weld pipe is very low, and lap-weld production is even lighter. Nails and wire are very quiet, with no immediate prospect for improvement. The local fabricators of building products are taking their usual summer quotas, and are insisting upon quick deliveries because of their low inventory condition.

Most Valley mills are very hopeful about the price structure, particularly on flat-rolled products. The new sheet prices are now being quoted by all makers in the district, and, while little tonnage has been taken at the higher levels now in effect, salesmen have been urged to impress the new classifications upon consumers, and this can be better accomplished in periods of light demand. It is considered significant that most of the low-priced tonnage driven in at the close of the month for shipment during July represents immediate consumer needs, with speculative buying almost entirely absent. The \$1 a ton advance on hot-rolled strip is general, and little business taken for July shipment will carry more than a \$1 concession. At the same time many smaller buyers are already paying 1.55c. and 1.65c., and wide adherence to these prices is expected after Aug. 1. Cold-rolled strip is also well maintained at 2.15c., Pittsburgh. Little interest has been taken in prices on plates and bars, and mills have been willing to extend second quarter contracts in all cases.

The market on raw materials is quiet, with scarcely any interest reported in the pig iron market. Scrap is stronger, although no consumer purchases are reported to establish the market at a higher level.

## PACIFIC COAST

**S**AN FRANCISCO, July 7.—Contracts for the 110,000 tons of steel for the Golden Gate bridge remain unplaced, pending sale of the initial block of a \$6,000,000 bond issue on July 8. Steel sales have been limited, and demand is light.

### BARS

A number of bids have been submitted on highway and construction projects, but no important lettings are reported. Out-of-stock prices in San Francisco continue firm at 2.60c., base, on carload lots, while Los Angeles quotations hold at 2.50c., base.

### PLATES

Award of a 400,000-gal. steel tank for the naval operating base at San Diego, Cal., was made to the Chicago Bridge & Iron Co. City of Tacoma is requesting bids on 8262 ft. of 52-in. steel pipe. Quotations continue at 2c., c.i.f.

### SHAPES

No outstanding awards have been reported, and movement is unusually light. Mill prices continue at 2.05c. to 2.15c., c.i.f.

### CAST IRON PIPE

Bids opened on 1614 tons of 4 to 12-in. pipe for the city of San Francisco water department brought out the lowest quotations in some years. United States Pipe & Foundry Co., low bidder, quoted 33.25c. per ft. on 83 tons of 4-in., 45c. on 645 tons of

## 110,000 Tons of Steel for Bridge May Be Let Soon

*Warehouse Prices, f.o.b. San Francisco  
(Less than 5000 Lb.)*

	Base per Lb.
Plates and structural shapes (1/4-in. and heavier).....	2.80c.
Soft steel bars.....	2.80c.
Reinforcing bars.....	2.90c.
Hot-rolled annealed sheets (No. 24).....	3.90c.
Hot-rolled sheets (No. 10).....	3.40c.
Galv. sheets (No. 24).....	4.40c.
Struc. rivets, 1/2-in. and larger—over 2 tons.....	5.50c.
Com. wire nails, base per keg.....	\$2.95
Cement c't'd nails, 100 lb. keg.....	2.95

*Warehouse Prices, f.o.b. Los Angeles  
(Less than 5000 Lb.)*

	Base per Lb.
Plates and structural shapes.....	3.00c.
Soft steel bars.....	3.00c.
Reinforcing bars.....	2.80c.
Hot-rolled annealed sheets (No. 24).....	4.00c.
Hot-rolled sheets (No. 10).....	3.50c.
Galv. sheets (No. 24).....	4.20c.
Struc. rivets, 1/2-in. and larger.....	5.00c.
Com. wire nails, base per keg.....	\$2.75
Cement c't'd nails, 100 lb. keg.....	2.75

*Warehouse Prices, f.o.b. Seattle  
(Less than 5000 Lb.)*

	Base per Lb.
Plates and structural shapes.....	3.00c.
Soft steel bars.....	2.50c.
Reinforcing bars.....	3.00c.
Hot-rolled annealed sheets (No. 24).....	3.65c.
Hot-rolled sheets (No. 10).....	3.15c.
Galv. sheets (No. 24).....	4.15c.

6-in., 61.25c. on 726 tons of 8-in. and \$1.078 on 160 tons of 12-in.

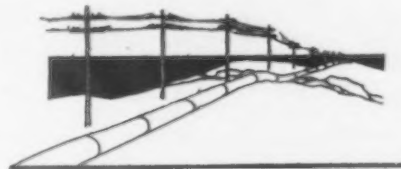
### SHEETS

The new classification and differentials, effective July 1, tended to increase demand slightly prior to the first of the month. All mills are maintaining the new prices, based on 2.90c., Pittsburgh, on galvanized sheets, and 2.40c. on hot-rolled annealed sheets, but, due to unsettled intercoastal water rates, the prices c.i.f. Pacific Coast ports have not been definitely announced.

No. 1 wrought.....	\$6.00	\$8.00
Machine shop turnings.....	2.00	2.00
Boiler plate.....	5.00	4.50
Heavy axle turnings.....	2.50	2.50
Cast borings.....	2.00	2.00
Steel borings.....	2.00	2.00
Wrought pipe.....	2.00	2.00
Steel axles.....	7.00	9.00
Axles, wrought iron.....	7.00	11.00
No. 1 machinery cast.....	10.00	10.00
Stove plate.....	8.00	8.00
Standard carwheels.....	8.50	8.50
Malleable.....	8.00	8.00

*Per Net Ton*

No. 1 mach'y cast.....	11.00	.....
Stove plate.....	9.00	.....
Standard carwheels.....	10.00	.....
Malleable scrap.....	9.00	.....



## PIPE LINES

Lycoming Natural Gas Co., Pittsburgh, has placed approximately 20,000 tons of seamless and lap-weld pipe for a 110-mile line from the Tioga, Pa., fields to Syracuse, N. Y., with the National Tube Co. and Spang, Chalfant & Co., Inc.

Vista Irrigation District, Vista, Cal., W. C. Witman, secretary, is asking bids until July 14 for 46,000 ft. steel pipe, from 3 to 8 in. diameter, for irrigation system.

Brokaw, Dixon, Garner & McKee, Tulsa, Okla., supervising engineers for Panhandle-Eastern pipe line in course of construction from natural gas fields of Texas to Kansas, Illinois and western Indiana, a joint project of several oil companies, have awarded contract to Sheehan Pipe Line Construction Co., Tulsa, for installation of a number of lateral lines connecting Jacksonville, Decatur, Champaign and Danville, Ill., with main feeder lines.

Mayes County Pipe Line Co., Pryor, Okla., is planning installation of a natural gas pipe line for service at Pryor and vicinity.

Water Department, City Hall, San Francisco, will take bids for construction of a pipe line near Altamont Pass, Alameda County, in connection with Hetch-Hetchy water supply project. Line will be about 35 miles long and will have daily capacity of 45,000,000 to 60,000,000 gal. Engineering Department, City Hall, is in charge.

## Railroad Equipment

Chicago & Illinois Midland has ordered four caboose cars from Pullman Car & Mfg. Corp.

Union Tank Car Co. has ordered 100 tank car tanks of 6500-gal. capacity from Graver Corp.

Bangor & Aroostook has ordered two 8-wheel switching locomotives from American Locomotive Co.

Tennessee Coal, Iron & Railroad Co. has ordered four flat cars and four steel transfer cars from Pullman Car & Mfg. Corp.

Ferrocarril Terminal Central de Buenos Aires has ordered 20 all-steel passenger cars from Pullman Standard Car Export Co. for use in subways of Buenos Aires.

Compañía Chilena de Electricidad of Santiago, Chile, has ordered 30 street electric railway cars from J. G. Brill Co.

## Canada

### Pig Iron and Scrap Markets Extremely Dull

**T**ORONTO, July 7.—Hot weather of the past week, in conjunction with Dominion Day holiday, took general toll of business in the Canadian pig iron markets. Sales dropped to a record low level for the year and were confined to lots of single cars. No forward booking is reported by local blast furnace representatives, although it is understood that a few melters have placed orders for iron for delivery over the next six weeks. Order books are lighter than at any time in several years. Prices are unchanged.

*Prices per gross ton:*

Delivered Toronto	
No. 1 fdy., sil. 2.25 to 2.75.....	\$22.60
No. 2 fdy., sil. 1.75 to 2.25.....	22.10
Malleable.....	22.60

Delivered Montreal	
No. 1 fdy., sil. 2.25 to 2.75.....	\$24.00
No. 2 fdy., sil. 1.75 to 2.25.....	23.50
Malleable.....	24.00
Basic.....	20.50

### STRUCTURAL STEEL

Business is holding up fairly well in some centers. The Montreal plant of Dominion Bridge Co. is working well in excess of 50 per cent of capacity. The Vancouver plant is also fairly active, but the Winnipeg and Toronto plants are not busy. While most sales of the past week were confined to lots under 100 tons, some large contracts are pending. Several big orders are expected in connection with the Quebec bridge building program.

### OLD MATERIAL

With new developments absent, business in this market approaches stagnation. Mills are not taking much in the way of heavy melting steel and turnings from dealers, but are picking up supplies from the railways. Shipments of steel scrap to Hamilton are negligible. The demand for iron grades is without change. Prices are unchanged.

*Dealers' buying prices for old material:  
Per Gross Ton*

	Toronto	Montreal
Heavy melting steel.....	\$7.00	\$6.00
Rails, scrap.....	7.00	6.00



# ▲▲ Semi-Finished Steel, Raw Materials, Bolts and Rivets ▲▲

## MILL PRICES OF SEMI-FINISHED STEEL

Billets and Blooms	
	Per Gross Ton
Rerolling, 4-in. and under 10-in., Pittsburgh	\$29.00 to \$30.00
Rerolling, 4-in. and under 10-in., Youngstown	29.00 to 30.00
Rerolling, 4-in. and under 10-in., Cleveland	29.00 to 30.00
Rerolling, 4-in. and under 10-in., Chicago	31.00 to 32.00
Forging quality, Pittsburgh	35.00 to 36.00

Sheet Bars (Open-Hearth or Bessemer)	
	Per Gross Ton
Pittsburgh	\$29.00 to \$30.00
Youngstown	29.00 to 30.00
Cleveland	29.00 to 30.00

Slabs (8 in. x 2 in. and under 10 in. x 10 in.)	
	Per Gross Ton
Pittsburgh	\$29.00 to \$30.00
Youngstown	29.00 to 30.00
Cleveland	29.00 to 30.00

Skelp (F.o.b. Pittsburgh or Youngstown)	
	Per Lb.
Grooved	1.65c
Universal	1.65c
Sheared	1.65c

Wire Rods (Common soft, base)	
	Per Gross Ton
Pittsburgh	\$35.00
Cleveland	35.00
Chicago	36.00

## PRICES OF RAW MATERIAL

Ores	
Lake Superior Ores, Delivered Lower Lake Ports	
	Per Gross Ton
Old range Bessemer, 51.50% iron	\$4.80
Old range non-Bessemer, 51.50% iron	4.65
Mesabi Bessemer, 51.50% iron	4.65
Mesabi non-Bessemer, 51.50% iron	4.50
High phosphorus, 51.50% iron	4.40

Foreign Ore, c.i.f. Philadelphia or Baltimore	
	Per Unit
Iron ore, low phos., copper free, 55 to 58% iron, dry, Spanish or Algerian, 8c. to 9c.	
Iron ore, low phos., Swedish, average 68% iron	10.00c.
Iron ore, basic or foundry, Swedish, average 65% iron	9.00c.
Iron ore, basic and foundry, Russian, average 63% iron	9.00c.
Manganese ore, washed 52% manganese, from the Caucasus	25c. to 27c.
Manganese ore, African or Indian, 50 to 52%	24c. to 26c.
Manganese ore, Brazilian, 46 to 48%	22c. to 24c.
Tungsten ore, high grade, per unit, in 60% concentrates	\$12.00 to \$12.50

Per Gross Ton	
Chrome ore, 45% Cr <sub>2</sub> O <sub>3</sub> crude, c.i.f. Atlantic seaboard	\$20.00
Chrome ore, 48% Cr <sub>2</sub> O <sub>3</sub> crude, c.i.f. Atlantic seaboard	22.50

Coke	
	Per Net Ton
Furnace, f.o.b. Connellsville prompt	\$2.40
Foundry, f.o.b. Connellsville prompt	3.25 to 4.50
Foundry, by-product, Ch'go ovens	7.50
Foundry, by-product, New England, del'd	10.50
Foundry, by-product, Newark or Jersey City, delivered	8.70 to 9.10
Foundry, by-product, Phila.	9.00
Foundry, Birmingham	5.00
Foundry, by-product, St. Louis, f.o.b. ovens	8.00
Foundry, by-product, del'd St. Louis	9.00

Coal	
	Per Net Ton
Mine run steam coal, f.o.b. W. Pa. mines	\$1.50 to \$1.60
Mine run coking coal, f.o.b. W. Pa. mines	1.50 to 1.60
Gas coal, 3/4-in., f.o.b. Pa. mines	1.80 to 2.00
Mine run gas coal, f.o.b. Pa. mines	1.70 to 1.80
Steam slack, f.o.b. W. Pa. mines	1.00 to 1.25
Gas slack, f.o.b. W. Pa. mines	1.10 to 1.25

Ferromanganese	
	Per Gross Ton
Domestic, 80%, seaboard	\$80.00 to \$85.00
Foreign, 80%, Atlantic or Gulf port, duty paid	\$80.00 to 85.00

\*Minimum price quoted for lots of 2000 tons or more.

Spiegeleisen	
	Per Gross Ton Furnace
Domestic, 19 to 21%	\$28.00 to \$30.00

Electric Ferrosilicon	
	Per Gross Ton Delivered
50%	\$83.50
75%	130.00
Per Gross Ton Furnace	
10%	\$35.00
11%	37.00
12%	14 to 16%
	\$39.00
	31.00

Bessemer Ferrosilicon	
F.o.b. Jackson County, Ohio, Furnace	
	Per Gross Ton
10%	\$25.00
11%	26.00
12%	27.00
13%	\$29.00
14%	31.00
15%	33.00

Silvery Iron	
F.o.b. Jackson County, Ohio, Furnace	
	Per Gross Ton
6%	\$19.00 to \$21.00
7%	19.50 to 21.50
8%	20.00 to 22.00
9%	20.50 to 22.50
10%	21.00 to 23.00
11%	\$22.00 to \$24.00
12%	23.00 to 25.00
13%	25.00 to 27.00
14%	27.00 to 29.00
15%	29.00 to 31.00

Other Ferroalloys	
Ferrotungsten, per lb. contained metal del'd, carloads	\$1.08
Ferrotungsten, less carloads	\$1.15 to 1.25
Ferrocromium, 4 to 6% carbon and up, 65 to 70% Cr., per lb. contained Cr. delivered, in carloads	11.00c.
Ferrocromium, 2% carbon	17.00c. to 17.50c.
Ferrocromium, 1% carbon	19.00c. to 20.00c.
Ferrocromium, 0.10% carbon	24.50c. to 26.00c.
Ferrocromium, 0.06% carbon	26.50c. to 28.00c.
Ferrovandium, per lb. contained vanadium, f.o.b. furnace	\$3.15 to \$3.65
Ferrocobaltititanium, 15 to 18%, per net ton, f.o.b. furnace, in carloads	\$160.00
Ferrophosphorus, electric or blast furnace material, in carloads, 18%, Rockdale, Tenn., base per gross ton	91.00
Ferrophosphorus, electric, 24%, f.o.b. Aniston, Ala., per gross ton	122.50
Silico spiegel, per ton, f.o.b. furnace, car lots	42.50
Ton lots or less, per ton	47.50

Silico-manganese, gross ton, delivered:	
2.50% carbon grade	\$105.00
1% carbon grade	115.00
Spot prices	\$5 a ton higher

Fluxes and Refractories	
Fluorspar	
	Per Net Ton
Domestic, 85% and over calcium fluoride, not over 5% silicon, gravel, f.o.b. Illinois and Kentucky mines	\$14.00
No. 2 lump, Illinois and Kentucky mines	17.00
Foreign, 85% calcium fluoride, not over 5% silicon, c.i.f. Atlantic port, duty paid	17.00
Domestic, No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2 1/2% silicon, f.o.b. Illinois and Kentucky mines	32.50

Fire Clay Brick	
Per 1000 f.o.b. Works	
High-Heat	Intermediate
Duty Brick	Heavy Duty Brick
Pennsylvania	\$40.00 to \$48.00
Maryland	40.00 to 43.00
New Jersey	40.00 to 43.00
Ohio	40.00 to 43.00
Kentucky	40.00 to 43.00
Missouri	40.00 to 43.00
Illinois	40.00 to 43.00
Ground fire clay, per ton	6.50

Silica Brick	
Per 1000 f.o.b. Works	
Pennsylvania	\$45.00
Chicago	49.00
Birmingham	47.00
Silica clay, per ton	8.00

Magnesite Brick	
Per Net Ton	
Standard sizes, f.o.b. Baltimore and Chester, Pa.	\$65.00
Grain magnesite, f.o.b. Baltimore and Chester, Pa.	40.00

Chrome Brick	
Per Net Ton	
Standard size	\$45.00

## MILL PRICES OF BOLTS, NUTS, RIVETS AND SET SCREWS

Bolts and Nuts	
(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)	
	Per Cent Off List
Machine bolts	73 and 10
Carriage bolts	73 and 10
Lag bolts	73 and 10
Plow bolts, Nos. 1, 2, 3 and 7 heads	73 and 10
Hot-pressed nuts, blank or tapped, square	73 and 10
Hot-pressed nuts, blank or tapped, hexagons	73 and 10
C.p.c. and t. square or hex. nuts, blank or tapped	73 and 10
Washers*	7.00c. to 6.75c. per lb. off list

\*F.o.b. Chicago, New York and Pittsburgh.  
†Bolts with rolled thread up to and including 3/4 in. x 6 in. take 10 per cent lower list prices.

Bolts and Nuts	
Per Cent Off List	
Semi-finished hexagons nuts	73 and 10
Semi-finished hexagons castellated nuts, S.A.E.	73 and 10
Stove bolts in packages, P'gh.	80, 10, 10, 10 and 5
Stove bolts in packages, Ch'go.	80, 10, 10, 10 and 5
Stove bolts in pkgs., Cleveland	80, 10, 10, 10 and 5
Stove bolts in bulk, P'gh.	80, 10, 10, 10, 5 and 2 1/2
Stove bolts in bulk, Ch'go.	80, 10, 10, 10, 5 and 2 1/2
Stove bolts in bulk, Cleveland	80, 10, 10, 10, 5 and 2 1/2
Tire bolts	80, 10, 10, 10, 5 and 2 1/2
Discounts of 73 and 10 per cent off on bolts and nuts apply on carload business with jobbers and large consumers.	

Large Rivets (1/2-in. and larger)	
	Base per 100 Lb.
F.o.b. Pittsburgh or Cleveland	\$2.75
F.o.b. Chicago	2.85

Small Rivets (7/8-in. and smaller)	
	Per Cent Off List
F.o.b. Pittsburgh	70, 10 and 5
F.o.b. Cleveland	70, 10 and 5
F.o.b. Chicago	70, 10 and 5
Cap and Set Screws	
(Freight allowed up to but not exceeding 50c. per 100 lb. on lots of 200 lb. or more)	
	Per Cent Off List
Milled cap screws	80, 10, 10 and 5
Milled standard set screws, case hardened	80 and 5
Milled headless set screws, cut thread	75 and 10
Upset hex. head cap screws, U.S.S.S. thread	85 and 10
Upset hex. cap screws, S.A.E. thread	85 and 10
Upset set screws	80, 10 and 5
Milled studs	70





# ▲▲▲ Non-Ferrous Metal Markets ▲▲▲

## Copper Back to 8.25c.— Tin Higher—Lead and Zinc Firm

NEW YORK, July 7.

### COPPER

Late on Tuesday, June 30, at least one custom smelter offered electrolytic copper at a concession from the 9c. quotation to which the market had risen during the week. This was the first sign of a weakness which has since spread. Because of offerings of customs smelters, the quotation has fallen to 8.25c. to 8.50c., delivered in the Connecticut Valley, depending on the seller. The incident was simply history repeating itself—the market had turned quiet and sales were not sufficient to cover the intake of custom smelters. The attitude of the primary producers has been an independent one to the extent that they still maintain their quotation nominally at 9c. Sales were so heavy in June that, even at the lower levels, the business done has thus far this month been very small. The quotation of Copper Exporters, Inc., is unchanged at 9.27½c., c.i.f. usual European ports. The spread, however, between this level and that of the domestic market is so large that foreign purchases have been very small during the past week. Lake copper is also inactive at 9c. to 9.12½c., delivered.

Negotiations for curtailment in production have been resumed, and it is understood that the principal hitch has been the disinclination of one Canadian producer to cooperate. The conviction is strong in the market that ultimately some agreement, resulting in substantial curtailment, is necessary to put the market on a satisfactory basis. Another unfavorable statistical report for June is expected in a few days. It is also pointed out that a stabilized price for copper, both for domestic and foreign consumers, is essential before a healthy condition can prevail.

### TIN

In anticipation of a favorable settlement of the Hoover moratorium negotiations there was some heavy buying of tin by speculators during the last week with Friday, July 3, the most active day. Yesterday and today the market has eased off from the higher prices, which were the result of the speculative buying. Unless the final settlement of the interna-

THE WEEK'S PRICES. CENTS PER POUND FOR EARLY DELIVERY					
	July 7	July 6	July 3	July 2	July 1
Lake copper, New York.....	9.12½	9.12½	9.12½	9.12½	9.12½
Electrolytic copper, N. Y.*.....	8.00	8.00	8.00	8.25	8.25
Straits tin, spot, N. Y. ....	26.00	26.35	26.65	26.00	25.70
Zinc, East St. Louis.....	3.95	3.95	3.95	4.00	3.90
Zinc, New York.....	4.30	4.30	4.30	4.35	4.25
Lead, St. Louis.....	4.22½	4.22½	4.22½	4.22½	4.22½
Lead, New York.....	4.40	4.40	4.40	4.40	4.40

\*Refinery quotation; price ¼c. higher delivered in the Connecticut Valley.

tional negotiations acts as a further spur to the market in the next few days, a very dull season is expected. Prices are higher than a week ago both here and abroad. In London today quotations were about £3 to £4 a ton higher than a week ago, with spot standard quoted at £117 12s. 6d., future standard at £119 10s., and spot Straits at £119 7s. 6d. The Singapore price today was £121 15s. Spot Straits tin here was quoted weak at 26c., New York, today.

For the first time in many weeks there was a decline in the stocks of tin in British warehouses, for the week ended July 4, of 116 tons, the total having been 32,076 tons. A shipment, however, of 200 tons to New York during the week accounts for the decrease. The world's visible supply at the end of June was 51,626 tons, an increase of 395 tons over that of the previous month. This was less than expected. The carry-over of stocks in the Straits Settlements was

7202 tons, an increase of 334 tons for June.

### LEAD

Following the heavy buying movement of a week ago, there has naturally been a lull, and the demand has receded to the nearby requirements of a few consumers which consist of carload and small lots. Some producers have sold their July output and a large proportion of that for August, and are therefore in a very comfortable position. Specifications on contract are reported as highly satisfactory, and consumption for both June and July will be the largest for any months this year. Prices continue firm at the recently established levels of 4.22½c., St. Louis, or 4.40c., New York, the latter being the contract price of the leading producer.

### ZINC

After advancing within the week to 4c., East St. Louis, prime Western

#### New York, Chicago or Cleveland Warehouse

##### Delivered Prices, Base per Lb.

High brass .....	16.25c.
*Copper, hot rolled, base sizes.....	18.87½c.
Seamless Tubes—	
Brass .....	21.12½c.
Copper .....	21.37½c.
Brass Rods .....	14.50c.
Braced Brass Tubes.....	25.12½c.

\*Extra for cold-rolled, 3c. per lb.

#### New York Warehouse

##### Delivered Prices, Base per Lb.

Zinc sheets (No. 9), casks .....	9.00c. to 9.50c.
Zinc sheets, open.....	10.00c. to 10.50c.

#### Metals from New York Warehouse

##### Delivered Prices, per Lb.

Tin, Straits pig.....	27.50c. to 28.50c.
Tin, bar .....	29.50c. to 31.50c.
Copper, Lake .....	11.00c. to 11.50c.
Copper, electrolytic .....	10.00c. to 10.50c.
Copper, casting .....	9.75c. to 10.25c.
Zinc, slab .....	4.50c. to 5.50c.
Lead, American pig.....	5.25c. to 6.25c.
Lead, bar .....	7.00c. to 8.00c.
Antimony, Asiatic .....	9.50c. to 10.50c.
Aluminum No. 1 ingots for remelting (guaranteed over 99% pure).....	20.00c. to 22.00c.
Alum. ingots, No. 12 alloy .....	19.00c. to 21.00c.
Babbitt metal, commercial grade .....	20.00c. to 30.00c.
Solder, ½ and ⅓.....	18.25c. to 19.25c.

#### Metals from Cleveland Warehouse

##### Delivered Prices, per Lb.

Tin, Straits pig.....	30.50c.
Tin, bar .....	32.50c.
Copper, Lake .....	10.25c.
Copper, electrolytic .....	10.25c.
Copper, castings .....	9.25c.
Zinc, slab .....	5.50c. to 5.75c.
Lead, American pig.....	5.25c.
Lead, bar .....	7.75c.
Antimony, Asiatic .....	10.00c.
Babbitt metal, medium grade.....	15.00c.
Babbitt metal, high grade.....	34.50c.
Solder, ½ and ⅓.....	19.50c.

#### Old Metals, Per Lb., New York

Buying prices represent what large dealers are paying for miscellaneous lots from smaller accumulators and selling prices are those charged consumers after the metal has been properly prepared for their uses.

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	6.50c.	7.25c.
Copper, hvy. and wire	6.25c.	7.00c.
Copper, light and bottoms .....	5.25c.	6.00c.
Brass, heavy .....	3.50c.	4.25c.
Brass, light .....	2.75c.	3.75c.
Hvy. machine composition .....	5.25c.	6.00c.
No. 1 yel. brass turnings .....	3.75c.	4.50c.
No. 1 red brass or compos. turnings..	4.50c.	5.25c.
Lead, heavy .....	3.25c.	3.75c.
Zinc .....	1.50c.	2.00c.
Sheet aluminum.....	9.50c.	11.50c.
Cast aluminum.....	3.50c.	6.00c.



zinc has eased off slightly, with some metal available from a few sources at 3.95c. Demand has also fallen off quite sharply, but some business is done quietly each day. Statistically the situation is satisfactory. Data for June, made public today, show a decline in stocks of refined zinc of all kinds of 4000 tons from May, with a decline in production of 2200 tons. An equally favorable showing is expected for July.

Prices for ore have again been advanced and now stand at \$22 to \$23, Joplin. These stocks are evidently closely held, as is indicated by the small sales last week of 1680 tons, said to be the lightest in many years. Shipments were over 3500 tons and production was about 3700 tons, leaving the estimated stocks at approximately 66,400 tons.

## ANTIMONY

Chinese metal, in a dull market, is slightly lower, being quoted at 7c. New York, duty paid, with futures at 6.75c.

## NICKEL

Electrolytic cathodes are quoted at 35c. a lb., and shot and ingot nickel from remelted electrolytic at 36c. a lb. for single lots, spot shipment.

## ALUMINUM

According to published prices, virgin metal, 98 to 99 per cent pure, is quoted at 22.90c. a lb. delivered.

## Detroit Scrap Market Shows Firmer Trend

DETROIT, July 7.—Speculative buying by dealers again has had the effect of stiffening scrap prices, with borings and turnings, hydraulic bundles and sheet clips bringing 25c. a ton more than they did a week ago. Heavy melting steel is firm at \$6.75 to \$7.25, and some dealers are bidding as high as \$7.50 for this grade. Dealers are reputed to have paid an average of 75c. to \$1 a ton more for material on the July list of automobile companies than in June. The only weakness is in cast iron items, for which the demand is virtually at a standstill.

Mills in most cases are heavily stocked with scrap and are not willing to pay prices which dealers are asking. Dealers, on the other hand, seem satisfied to accumulate yard stocks in anticipation of a rising market in the early fall.

Dealers' buying prices per gross ton, f.o.b. cars, Detroit:

Hvy. melting and shov. steel	\$6.75 to	\$7.25
Borings and short turnings	4.25 to	4.75
Long turnings	3.50 to	4.00
No. 1 machinery cast	8.00 to	8.50
Automotive cast	11.00 to	11.50
Hydraul. comp. sheets	6.75 to	7.25
Stove plate	5.50 to	6.00
New No. 1 busheling	5.50 to	6.00
Old No. 2 busheling	2.50 to	3.00
Sheet clippings	3.75 to	4.25
Flashings	5.75 to	6.25

# FABRICATED STRUCTURAL STEEL

## Projects of 26,500 Tons Include 10,000 Tons for Chicago Drive—Awards Only 15,500 Tons

FABRICATED structural steel projects total 26,500 tons, compared with 19,000 tons a week ago and 44,000 tons two weeks ago. Among the larger tonnages in this week's total are 10,000 tons for an extension of Wacker Drive and completion of a viaduct, and 2000 tons for a bridge and viaduct at Ogden Slip on Outer Drive in Chicago. A telephone exchange addition in Indianapolis calls for 2100 tons, an addition to the Bankers' Trust Co. Building in New York 2500 tons and a senior high school in Rochester, N. Y., 1400 tons.

Awards of 15,500 tons compare with 20,000 tons a week ago and 34,000 tons two weeks ago. Included are 1878 tons for a grade crossing elimination on the Germantown-Chestnut Hill line of the Reading Railroad, 1100 tons for viaducts in Buffalo, 1000 tons for dock sheds at Lake Charles, La., 970 tons for a bascule bridge on Metropolitan Avenue, Brooklyn, and 760 tons for a mill building at Trion, Ga. Awards follow:

### North Atlantic States

JONESPORT, ME., 265 tons, granite cutting shed, to McClintic-Marshall Corpn.  
 SQUANTUM, MASS., 265 tons, hangar extension, to Belmont Iron Works.  
 PEEKSKILL, N. Y., 800 tons, highway bridge, to McClintic-Marshall Corpn.  
 BALTIMORE & OHIO RAILROAD, 200 tons, bridge in Maryland, to American Bridge Co.  
 BUFFALO, 1100 tons, viaducts, to Mount Vernon Bridge Co.  
 STATE OF NEW JERSEY, 310 tons, bascule lift bridge, to McClintic-Marshall Corpn.  
 BROOKLYN, 970 tons, Metropolitan Avenue bascule bridge, to McClintic-Marshall Corpn.  
 STATE OF NEW YORK, 825 tons, highway bridge No. 1896, to McClintic-Marshall Corpn.  
 EAST AURORA, N. Y., 300 tons, high school, to McClintic-Marshall Corpn.  
 HILLBURN, N. Y., 495 tons Erie Railroad Bridge, to American Bridge Co.  
 YORKTOWN, N. J., 130 tons, fire station, to Selbach & Meyers.  
 STATE COLLEGE, PA., 750 tons, home economics and dairy creamery building for Pennsylvania State College, to Bethlehem Construction Co.  
 SYRACUSE, N. Y., 400 tons, State armory, to Ingalls Iron Works.  
 READING CO., 1878 tons, grade crossing elimination on Germantown-Chestnut Hill line, to McClintic-Marshall Corpn.

### The South and Southwest

TRION, GA., 760 tons, mill building, to McClintic-Marshall Corpn.  
 MEMPHIS, TENN., 100 tons, school, to Pidgeon-Thomas Iron Co.  
 VICKSBURG, MISS., 125 tons, 20 pontoons for United States Engineer, to Chicago Bridge & Iron Works.  
 LAKE ARBOR, LA., 452 tons, bridge for Louisiana Highway Commission to Ingalls Iron Works.  
 LAKE CHARLES, LA., 1000 tons, dock sheds, to Jones & Laughlin Steel Corpn.  
 BRYAN JUNCTION, TEX., 450 tons, bridge, to Missouri Valley Bridge Co.  
 OKLAHOMA CITY, 400 tons, Robinson Avenue viaduct, to Capitol Steel & Iron Co., Topeka.  
 ADAMAMA, ARIZ., 225 tons, Rio Puerco bridge for Arizona Highway Commission, to Virginia Bridge & Iron Co.  
 STATE OF OKLAHOMA, 400 tons, bridge, to Stupp Brothers.

### Central States

INDIANAPOLIS, 300 tons, grand stand, to Central States Bridge & Structural Co.  
 SOUTH CHICAGO, 500 tons, blast furnace work for Interlake Iron Corpn., to John Moore & Sons.  
 CHICAGO, 205 tons, Inland Steel Co., to McClintic-Marshall Corpn.  
 CHICAGO, 150 tons, addition to Maurice Rothchild building, to Duffin Iron Co.  
 QUINCY, ILL., 400 tons, high school, to Rock Island Bridge & Iron Co.  
 DIXON, ILL., 125 tons, bridge for Chicago & North Western, to American Bridge Co.  
 DUBUQUE, IOWA., 300 tons, boat, to Dubuque Boat & Boiler Co.  
 JEFFERSON CITY, MO., 115 tons, two bridge spans for Missouri Highway Commission, to St. Louis Structural Steel Co.

### Western States

SAN FRANCISCO, 174 tons, apartment building for Allen & Co., to Herrick Iron Works.

### Canada

TORONTO, 720 tons, addition to East Block, Provincial Government, to Canadian Bridge Co.

### STRUCTURAL PROJECTS PENDING

Inquiries for fabricated steel work include the following:

### North Atlantic States

BUCKSPORT, ME., 500 tons, State bridge.  
 NEWTON, MASS., 500 tons, war memorial building.  
 LAWRENCE, MASS., 500 tons, Paramount Theater.  
 STATE OF MASSACHUSETTS, 300 tons, highway bridges.  
 NEW HAVEN, CONN., 500 tons, Yale University dormitory.  
 STATE OF NEW YORK, 500 tons, highway bridges.  
 NEW YORK, 1200 tons, church building at Thirteenth Street and Seventh Avenue, for Metropolitan Temple.  
 NEW YORK, 2500 tons, addition to Bankers' Trust Co. building at Pine, Nassau and Wall Streets.  
 BROOKLYN, 1000 tons, 16-story apartment building on Lafayette Avenue.  
 STATE OF PENNSYLVANIA, 200 tons, highway bridge.  
 ROCHESTER, N. Y., 1400 tons, Charlotte Junior-Senior High School; bids July 9.



#### The South

HOUSTON, TEX., 500 tons, addition to Post Office.

FORT WORTH, TEX., 1000 tons, Post Office.

#### Central States

INDIANAPOLIS, 2100 tons, addition to telephone exchange.

CHICAGO, 45,000 tons, Post Office; bids opened Aug. 10.

VIROQUA, Wis., 290 tons, State highway bridge in Vernon County; bids close July 14.

STATE OF ILLINOIS, 316 tons; Alexandria County bridge, 177 tons; Saline County Bridge, 139 tons; bids opened July 15.

CHICAGO, 400 tons, nurses' home at Cook County Hospital.

CHICAGO, 2000 tons, plans in about 10 days for bridge and viaduct at Ogden Slip on Outer drive.

CHICAGO, 10,000 tons, plans ready in August for extension of Wacker Drive and completion of Randolph Street viaduct.

#### Western States

SAN FRANCISCO, 590 tons, health center building.

STOCKTON, CAL., 230 tons, theater.

Pequa, 200 tons; Municipal Contracting Co., general contractor.

FORT JAY, NEW YORK, 100 tons, hospital building on Governors Island; Supreme Construction Co., general contractor.

OSSINING, N. Y., 100 tons, gasoline bulk station for Texas Corp.; Closson Parkhurst Engineering Corp., New York, general contractor.

NEWARK, N. J., 100 tons, sewer construction.

HACKENSACK, N. J., 290 tons, reservoir for Hackensack Water Co.

STATE OF NEW JERSEY, 225 tons, highway bridges and road construction in Warren County; bids in.

STATE OF NEW JERSEY, 100 tons, highway construction in Sussex County; bids in.

STATE OF NEW JERSEY, 155 tons, highway bridges and road construction in Morris and Essex Counties, Frank Snead,

Pompton Lake, N. J., low for general contract.

ELIZABETH, N. J., 1500 tons, sewage disposal plant.

WASHINGTON, 200 tons, barracks and boiler house, Naval Air Station, Anacostia, D. C.; Worsham Brothers, Nashville, Tenn., general contractors.

CHICAGO, 250 tons, Children's Memorial Hospital.

CHICAGO, 125 tons, Santa Fe overhead crossing.

CHICAGO, 5000 tons, Post Office; bids close Aug. 10.

CHICAGO, 750 tons, Western Electric Co.; Wilmette Construction Co., general contractor.

CHICAGO, 1200 tons, Nurses' Home at Cook County Hospital.

CHICAGO, 210 tons, Humbolt Park station for Commonwealth Edison Co.

## Southern Railroads Ordered to Cancel Rate Increases to North

### Higher Tariff on "Special Iron" List not Permitted by Interstate Commerce Commission

### Reinforcing Steel

#### Awards and Inquiries Lightest in Several Weeks

TOTAL lettings of reinforcing steel the past week called for only 1750 tons. The largest award was 500 tons for a memorial library in Baltimore. About 4550 tons is added to pending projects, which include 1500 tons for a sewage disposal plant in Elizabeth, N. J., and 1200 tons for a Nurses' Home in Chicago. Awards follow:

CAMBRIDGE, MASS., 280 tons, Whitehead Metal Products Co. plant, to Northern Steel Co.

PERKSKILL, N. Y., 368 tons, extension to Bronx River Parkway for County Park Commission, to Truscon Steel Co.

BALTIMORE, 500 tons, Enoch Pratt Memorial Library, to Deitrich Brothers.

CUMBERLAND, MD., 300 tons, Kuhn's Creek dam; from Vang Construction Co., general contractor, to Fort Pitt Bridge Works Co.

KENOSHA, WIS., 200 tons, track elevation for Chicago & North Western, to various bidders.

WINNETKA, ILL., 100 tons, mesh for paving to concrete Engineering Co.

#### Reinforcing Bars Pending

Inquiries for reinforcing steel bars include the following:

BOSTON, 250 tons, East Boston tunnel.

READING CO., 206 tons, grade crossing elimination on Germantown-Chestnut Hill line; James M. McGraw Co., Philadelphia, general contractor.

NEW YORK, 200 tons, building in Bronx for Casman Laundry Corp.; Spencer, White & Prentiss, contractors for foundations.

STATE OF NEW YORK, 300 tons, bridge on Northern Boulevard on Long Island; 100 tons, Smith Brothers, Pelham, N. Y., general contractors. Bridges on Southern State Parkway and at Massa-

WASHINGTON, July 7.—The Interstate Commerce Commission has ordered railroads to cancel proposed tariff schedules which would increase rates on certain products in the so-called "special iron" list from Birmingham and other Southern points to Trunk Line, New England and Buffalo-Pittsburgh territories.

The railroads had proposed to cancel commodity rates and substitute eighth-class rates under the governing Southern classification. The effect of the proposed rates is indicated from the statement of the commission that present rates would be increased 31.6 per cent from Birmingham.

The commission points out that the Southern railroads, since suspension of the schedules, became convinced that the competitive situation in the destination territory would exclude Southern manufacturers from that territory if they were forced to pay the eighth-class basis, while competing producers in that territory enjoy the lower rates prescribed in the so-called Official scale in connection with the general iron and steel rate investigation covering Official Classification territory. The Southern carriers consequently broke away from the Northern carriers and proposed to substitute for the suspended schedules the so-called Official scale and with it increase the minimum carloading from 36,000 lb., to 40,000 lb.

"There is not enough business in the South to support the industry, the consumption of iron and steel in that territory being only 4.13 per cent of that in Official Territory," the decision states. "Northern producers now get

into the South on the same basis of rates as is maintained in the South, and Southern producers insist that they should have the destination basis of rates accorded them on their traffic to the north so as to place them on a rate equality, differences in distance considered, with their Northern competitors."

Under the proposed schedules, the Birmingham-Boston rate of 51c. a 100 lb., would have been increased to 69c. while under the Official scale it would become 59c., including 2c. for New York Harbor transfer. At present a rate of 49c. applies from Birmingham to New York, Philadelphia, Baltimore; Elmira, Albany, Syracuse, Rochester, N. Y.; Scranton, Lancaster and Harrisburg, Pa.; Trenton, N. J., Wilmington, Del., and Washington. This rate would have been increased by the proposed schedules to rates ranging from 60c. to as high as 69c., while the Official scale would call for rates ranging from 43c. to 54c.

The commission left establishment of new rates to the carriers, but made the following suggestive comment:

"It is the common practice of carriers to establish less than reasonable maximum rates when they desire to place manufacturers in a position to distribute in distant markets in competition with manufacturers more favorably situated, and the propriety of such action, within reasonable limits, has been repeatedly upheld by us. . . . Whether such reasonable limits would permit respondents to establish the substitute basis we are not here called upon to determine, and we express no opinion with respect thereto."

# British Steel Market Begins to React to Proposal of Debt Moratorium

(By Cable)

LONDON, ENGLAND, July 6.

THE Hoover proposal for a debt moratorium has not only resulted in a firmer tone to Continental markets, but is bringing a slight renewal of interest in British iron and steel.

Pig iron consumption is still limited and it is believed that a price reduction is essential to recovery of buying. Midland iron prices have been reaffirmed and Cleveland makers are still refusing to grant concessions in the belief that buying would not be increased.

Steel inquiry is broadening, but much business is being withheld until after the steel makers' meeting, July 10. Meanwhile, mills are operating irregularly.

Tin plate demand is improving generally, and mills which are keen to resume operations are booking all the tonnage possible, even at low prices. Consequently quotations show but little change, although there are fewer sellers at 13s. 3d. (\$3.22) per base box and prices are expected to advance.

Domestic and export inquiry for tin plate is spread over the rest of the year, and certain buyers want delivery into 1932.

Galvanized sheets are quiet with a lack of substantial Indian demand and only minor business from other markets.

Continental steel prices are firm as a result of the Hoover plan, and

Soviet Union's 300,000-ton steel order in Germany was at 1.04c. for shapes, 1.13c. for bars and 1.43c. for sheets, f.o.b. German port.

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German machinery builders investigate Canada as location for new plants.

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Chile postpones building new steel plant at Puerto Corral because of economic conditions.

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Persia awards locomotives valued at \$13,400,000 to Swedish builders.

\* \* \*

Italian aluminum plant costing \$7,500,000 starts production in Naples.

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makers' reluctance to book fresh business at unprofitable levels. Sales to Holland and the Far East were active prior to the recent advances, but continued selling at advanced prices is difficult.

Clyde launchings in June were two vessels of 10,600 tons, bringing the total for six months to 36 vessels of 104,000 tons, the lowest in many years.

The National Canning Co. has opened a factory at Evesham, Worcester.

The Continental Wire Rod Cartel has been prolonged until the end of this year with the third quarter quota unchanged.

German sales to the Soviet Union are reported to have been negotiated at the following base prices for open-hearth steel, f.o.b. German ports: About 60,000 tons of billets and shapes at £4 10s. and £4 13s. (\$21.87 and \$22.60) per ton for the billets and £4 14s. per ton (1.04c. per lb.) for the shapes; about 120,000 tons of steel bars at £5 2s. 6d. per ton (1.13c. per lb.) and 120,000 tons of sheets and plates, consisting of plates at £6 5s. and £6 12s. 6d. per ton (1.38c. and 1.46c. per lb.), sheets at £6 10s. and £6 17s. 6d. per ton (1.43c. and 1.51c. per lb.) and universal iron at £6 2s. per ton (1.34c. per lb.). Delivery of the entire contract is to be within three months after receipt of specifications.

Swedish shops have received orders from Persia for locomotives to the extent of 50,000,000 kroner (\$13,400,000).

The French syndicate controlling shapes has been renewed provisionally until the end of 1932, but the semi-finished syndicate renewal is still being negotiated. Prospects for formation of a bar syndicate in France are believed to be less favorable than previously.

Belgian output in May was 271,000 tons of pig iron, 245,000 tons of raw steel and 186,000 tons of rolled steel.

Polish output in May was 34,000

## British and Continental European Export Prices per gross ton, f.o.b. United Kingdom Ports, Hamburg and Antwerp with the £ at \$4.8665 (par)

British Prices, f.o.b. United Kingdom Ports							
Ferromanganese, export.	£9 0s.		\$43.74	Billets, Thomas (nominal)	£3 5s.	to £3 7s.	\$15.80 to \$16.28
Billets, open-hearth....	5 0	to £5 7½s.	24.30 to \$26.12	Wire rods, low C., No. 5			
Black sheets, Japanese				B.W.G. ....	5 0	to 5 5½	24.30 to 25.64
specifications .....	10 5		49.82	Rails, light .....	6 0		29.20
Tin plate, per base box...	0 13½	to 0 14¼	3.25 to 3.46	Black sheets, No. 31			
			Cents a Lb.	gage, Japanese .....	11 5	to 12 12	54.68 to 58.32
Steel bars, open-hearth..	7 17½	to 8 7½	1.71 to 1.81				Cents a Lb.
Beams, open-hearth....	7 7½	to 7 17½	1.60 to 1.71	Steel bars, merchant....	3 10	to 3 12½	0.76 to 0.78
Channels, open-hearth....	7 12½	to 8 2½	1.66 to 1.76	Beams, Thomas, British			
Angles, open-hearth....	7 7½	to 7 17½	1.60 to 1.71	standard (nominal) ..	3 8½	to 3 10	0.74 to 0.76
Black sheets, No. 24 gage	8 10		1.84	Channels, Thomas, Amer-			
Galvanized sheets, No. 24				ican sections .....	5 12	to 5 14	1.24 to 1.26
gage .....	9 12½		2.08	Angles, Thomas, 4-in.			
				and larger, over ¾-in.			
				thick .....	3 9	to 3 10	0.75 to 0.76
				Angles, Thomas, 3-in....	3 11	to 3 12	0.77 to 0.78
				Hoops and strip steel over			
				6-in. base .....	4 0	to 4 2½	0.87 to 0.89
				Wire, plain, No. 8 gage..	5 0		1.09
				Wire, barbed, 4-pt. No.			
				12 B.W.G.....	8 15		1.89
Continental Prices, f.o.b. Antwerp or Hamburg							
Foundry iron, 2.50 to							
3.00 per cent sil., 1.00							
per cent and more							
phos. ....	£2 8s.	to £2 9s.	\$11.66 to \$11.91				

tons of pig iron, 106,000 tons of raw steel, 72,000 tons of rolled steel and 6000 tons of tubes.

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## German Steel Deliveries on Reparations Heavy

HAMBURG, GERMANY, June 24.—Deliveries of iron and steel products on reparations were heavy in May, totaling 9,500,000 m. (\$2,270,500). Machinery, not including electrical equipment, was 6,500,000 m. (\$1,533,500), electrical equipment was 1,500,000 m. (\$358,500), and ships 4,800,000 m. (\$1,147,200).

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## Soviet Standardization Brings Great Savings

Adoption of the standardization methods developed in the United States and in leading industrial nations of Europe is saving the Soviet Union hundreds of millions of dollars annually and promises even greater savings before completion of the five-year plan, says D. G. Budnevich of the U. S. S. R. Standards Committee in an article in the American Standards Association bulletin.

By means of newspapers and popular standardization magazines, Russia has enlisted popular support for elimination of waste through standardization. In the construction industries alone, nearly \$500,000,000 is estimated as the saving in 1932, he says. By standardizing the ash content of coking coal at 2 per cent under the previous prevailing percentage, it is expected that this year 60,000 freight cars will be released in the transportation of coal, and blast furnace output will be increased.

By the end of this year it is planned to have the coal mining industry completely standardized, the iron and steel industry about 75 per cent and the machine construction industry 25 to 30 per cent standardized.

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## German Railroads Buy on Two-Year Credit

DÜSSELDORF, GERMANY, June 22.—To obtain an order from the German Railway Administration, the steel industry is financing contracts totaling 60,000 tons of rails, steel ties and other track materials to be delivered in the next six months. Payments will be made by the railroads in 18 installments over a period of two years. Without this credit, the railroads would have been unable to buy necessary materials for repairs and replacement.

## British Plants to Make 100,000,000 Cans Yearly

WASHINGTON, July 7.—A new can-making plant with a capacity of 20 cans a second in 22 different sizes will start production soon at Perry Wood, Worcester, England, says a report to the Department of Commerce. The plant was erected at a cost of \$1,216,625 and is expected to make a maximum of 100,000,000 cans annually, with provision for expanding output to three times the initial capacity should demand require it. Manufacture is completely mechanized. Officials of the company term it "the most efficient factory of its kind in the world."

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## Lower Rail Prices Urged on Continental Cartel

HAMBURG, GERMANY, June 24.—At the July meeting of the International Rail Makers' Association, certain members will vigorously urge drastic reduction in the export price of rails, which is about 100 per cent more than the current price on shapes, compared with a usual difference in price of 5 to 10 per cent. The association has received numerous protests from overseas railroads. South African railroads have placed a 5000-ton trial order with the Japanese producer, which is not a member of the association.

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## Canadian Plants Planned By German Companies

ESSEN, GERMANY, June 22.—Representatives of the Friedrich Krupp A. G. recently made a survey in Canada to determine the feasibility of establishing a steel plant. A report has been made, and decision by the Krupp interests is expected shortly. Meanwhile certain machinery manufacturers in Germany have sent representatives to Canada to investigate the possibility of building a plant or acquiring an interest in some existing Canadian machinery building company. The movement of German companies to build plants in Canada has been given impetus by the present adverse Canadian tariff.

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One of the largest orders for vacuum equipment ever placed by the oil refining industry has been received by Aleo Products, Inc., division of American Locomotive Co., from the Amtorg Trading Corp. The order calls for the design and manufacture of five high vacuum distilling units, with a combined capacity of 30,000

bbl. a day, for processing reduced crude oil. Fabrication will be done at the Dunkirk, N. Y., plant of the American Locomotive Co. Delivery is expected to begin in three or four months.

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## Soviet Union Building Zinc and Lead Plants

Completion of a zinc and lead smelter at Vladikavkaz in the North Caucasus, U. S. S. R., is scheduled for the end of this year, according to the Amtorg Trading Corp., New York. The zinc plant is to have an annual capacity of 20,000 tons and the lead smelter 12,000 tons.

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## Soviet Steel Orders Total 700,000 Tons

HAMBURG, GERMANY, June 24.—Since Jan. 1, the U. S. S. R. has placed orders in Europe for 700,000 tons of steel, compared with 350,000 tons for all of 1930 and about 186,000 tons in 1929. Recently the Soviet has increased the total of steel purchased in Germany to 300,000 tons, and has bought 25,000 tons of rails and steel ties and 2100 tons of transformer sheets in Poland, bringing total orders to Poland to about 300,000 tons. Russian purchases of machinery and equipment in Germany have totaled 210,000,000 m. (\$50,200,000) since the first week in May.

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## New Italian Plant Producing Aluminum

ROME, ITALY, June 24.—The Societa Prodotti Chimici at Naples, in which the Aluminum Co. of America has an interest, has started production of aluminum in its new plant, one of the largest on the Continent. The works, which cost about \$7,500,000 to construct, will make aluminum by a new process.

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## Chilean Steel Plant Construction Postponed

HAMBURG, GERMANY, June 24.—Construction of a new steel works at Puerto Corral, Chile, plans for which have been prepared by the Krupp interests, has been postponed indefinitely because of the present economic conditions in Chile.



# NEW TRADE PUBLICATIONS

**Mill Equipment.**—Mine & Smelter Supply Co., Denver. Ball and rod mills, concentrating tables, centrifugal sand pumps and laboratory specials for the mill are briefly described in an illustrated folder.

**Wheeled Tanks, Trucks, Trays.**—Standard Pressed Steel Co., Jenkintown, Pa. Illustrated 36-page catalog covers specifications of a new line of "Hallowell" miscellaneous wheeled and stationary equipment.

**Heaters.**—H. O. Swoboda, Inc., 3400 Forbes Street, Pittsburgh. Brief bulletin discussing the comparative advantages of tubular electric immersion heaters and tubular fluid heaters.

**Mills.**—United Engineering & Foundry Co., Farmers Bank Building, Pittsburgh. Bulletin No. 201 explains the make-up of hot and cold mills for laboratory work on ferrous and non-ferrous metals, or alloys, on rounds, squares, flats, or shapes of small size and under varying conditions.

**Cable Power Scrapers.**—Atlas Conveyor Co., 20 South Fifteenth Street, Philadelphia. An 8-page booklet, covering cable power system for storing coal and other bulk material.

**Hydraulic Lift Trucks.**—Lyon Iron Works, Greene, N. Y. Bulletin No. 105 gives specifications and information covering operation of hydraulic lift truck, of 6000-lb. capacity.

**Car Spotters.**—H. W. Caldwell & Son Co., 2410 West Eighteenth Street, Chicago. A 12-page book describing car spotters, pointing out their important features, and giving complete dimensions, capacities, horsepower of motors, speeds, etc. It also gives varied applications of the units and a chart and method of figuring the degree of curvature of railroad tracks and actual pull on the car spotter rope.

**Lighting.**—Miller Co., (Ivanhoe division), Meriden, Conn. A folder illustrating and describing the new duopurpose fixtures being made by this company. In design the fixtures are ordinary equipment used in general lighting, but in construction they embody the usual Mazda lamps for illumination and in a second circuit the new General Electric S-1 Mazda sun lamps for ultra-violet radiation. Thus, in a single fixture, light is provided for general illumination and ultra-violet lighting for health purposes.

**Corrugated Pipe.**—American Rolling Mill Co., Middletown, Ohio. A 24-page catalog and reference booklet on the use of corrugated ingot iron pipe in storm sewers, illustrated with installations in different cities. Specifications of corrugated pipe needed for sewers of various sizes and tables to determine the proper size of such sewers are included.

**Safety.**—National Safety Council, Chicago. A 40-page booklet giving a complete national report on accident injuries in 28 American industries for 1930 and previous years. It condenses the accident experiences in 1930 of 4198 industrial establishments, representing 5,206,395 man-hours of work. Reports from industrial plants in 1930 included 600 more establishments than had reported previously. The 1930 report shows that, of 28 major industries covered, the 13 with the highest accident rates had about one-third the total exposure in man-hours and accounted for nearly one-half of all injuries. In a listing of industries in order of frequency of accidents, the steel industry ranks fifth with a frequency rate of 11.99, the machinery industry is eighth with a rate of 14.11, non-ferrous metal plants are twelfth

with a rate of 17.14, metal products plants thirteenth with a rate of 17.59, foundries twenty-second with a rate of 32.11 and mining twenty-seventh with a rate of 49.34. The highest accident rate of all is in construction work, with a frequency rate of 51.57.

**Cement.**—United States Stoneware Co., 50 Church Street, New York. A reprint of a paper on "Quick-Setting Silicate of Soda Cements for Acid-Proof Tank and Tower Construction," which was presented by Foster Dee Snell and Howard Farkas of the company at the meeting of the American Chemical Society in Indianapolis, March 30 to April 3.

**Turbo-Blowers and Turbo-Compressors.**—Ingersoll-Rand Co., 11 Broadway, New York. Bulletin 3132, 44 pages, illustrates and describes turbo-blowers and turbo-compressors, and gives information relative to construction and operation of the single-stage and multi-stage types. Thirty-seven illustrations, including sectional drawings, charts, blower parts and complete units, are shown.

**Fabricated Steel-Plate Work.**—Allis-Chalmers Mfg. Co., Milwaukee. Leaflet 2133, devoted to brief discussion of facilities for rolling angles, bars, shapes and plates; flanging and welding.

**Braking Equipment.**—Electric Controller & Mfg. Co., Cleveland. Illustrated pamphlet outlines the features of a new dynamic braking bridge-stop controller for overhead cranes.

**Tramrails.**—Cleveland Electric Tram-rail Division, Cleveland Crane & Engineering Co., Wickliffe, Ohio. Leaflet devoted to illustrations, picturing materials and product handling in the foundry.

**Valves.**—American Car & Foundry Co., Valve Division, Detroit. Catalog No. 1, 24 pages, illustrated, covers general description, advantages, uses

## INSULATING REGENERATORS TO CONSERVE FUEL

**OPEN-HEARTH** furnaces of the Great Lakes Steel Corp., Detroit. This plant was described in *THE IRON AGE* of Nov. 27, 1930, page 1607. Through the opening in the pit in foreground can be seen one regenerator chamber of the first furnace. This is fully insulated and inclosed in steel plate, as a means of preventing air infiltration and thereby reducing heat losses, improving combustion conditions, bettering the control of furnace operation, and decreasing fuel consumption.



and other information on Milliken valves.

**Oil Burners.**—H. B. Smith Co., Westfield, Mass. Illustrated booklet dealing generally with oil-burning boilers; another section is devoted to engineering information on problems of oil combustion and automatic control.

**Alloy Steels.**—A 132-page handbook, distributed by the Republic Steel Corp., Youngstown. Presents recent and informative data on various types of alloy steels produced by the Republic corporation, including complete instructions, given in convenient chart form, for heat treatment of these steels. Some of the types covered are the UMA treated chrome steels, nickel, nickel-chrome, nickel-molybdenum, chrome-vanadium, carbon-vanadium, chrome-molybdenum and others.

**Spiral Welded Pipe.**—An illustrated, 40-page handbook on Armeo spiral welded pipe, issued by the American Rolling Mill Co., Middletown, Ohio. Contains information on specially designed pipe requiring a range of diameters from 6 to 24 in., and a variety of wall thicknesses. It describes the spiral welded process and the economies derived by using this product. Types of coatings, couplings, joints, fittings and flanges are discussed, and complete specifications and tables are also given.

**Iron Pipe.**—A 64-page booklet, issued by the Republic Steel Corp., Youngstown. Several interesting examples of service under severe conditions are illustrated. Resistance to rust and corrosion and the extreme workability of copper-molybdenum-iron alloy pipe are pointed out.

**Proving Instruments.**—Morehouse Machine Co., York, Pa. Illustrated leaflet, covering proving instruments for checking testing machines, made in capacities 2000 to 300,000 lb.

**Piping and Valves.**—Semet-Solvay Engineering Corp., 40 Rector Street, New York. Bulletin No. 44, 48 pages, with illustrations, covers piping and valves. It includes tables of standards, suggestions for efficient planning of new piping, and diagrams of operating arrangements for gate valves.

**Feed-Water Regulation Equipment.**—Northern Equipment Co., Erie, Pa. Illustrated bulletin, 16 pages, devoted to description of Copes feed-water regulation equipment. A second booklet deals with problems of differential pressure control, pointing out the advantages of efficient regulation systems.

**Tramrails.**—Cleveland Electric Tram-rail Division, Cleveland Crane & Engineering Co., Wickliffe, Ohio. Illustrated leaflet pictures the handling of materials and product through ovens and dryers by use of tramrail equipment.

**Steam Turbines.**—De Laval Steam Turbine Co., Trenton, N. J. Details of the tanker G. Harrison Smith and her equipment are given in an illustrated leaflet containing reprint article, with text particularly devoted to turbines, gears and generating units with which this ship is equipped.

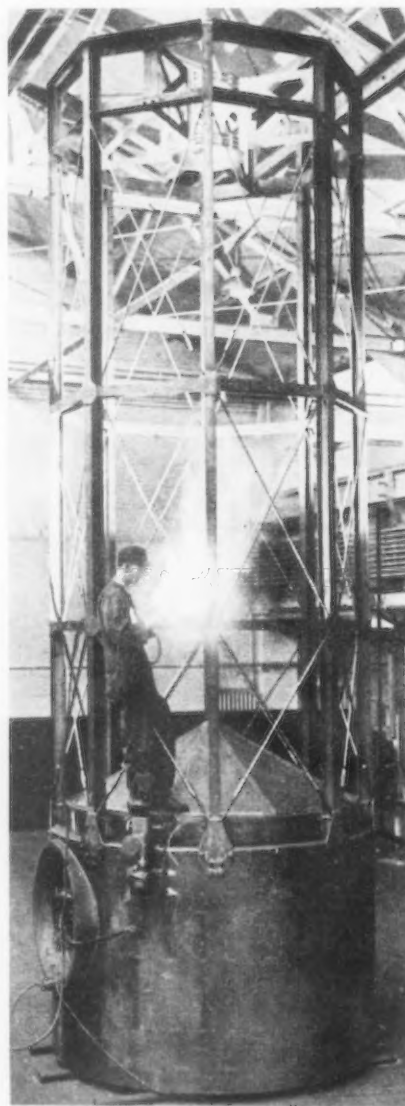
**Diesel Engines.**—Busch-Sulzer Brothers-Diesel Engine Co., St. Louis. An elaborate and copiously illustrated booklet, of some 50 pages, mainly given to a number of power-plant installations of Diesel engines.

**Steel Flooring and Floor Armoring.**—Kerlow Steel Flooring Co., Jersey City, N. J. A 20-page booklet, containing many illustrations of installations of steel flooring and gratings, with descriptions of the various types of steel flooring and floor armoring made by the company.

**Steam Turbines.**—American Bauer-Wach Corp., 11 Broadway, New York. An article reprint on turbines, covering description of exhaust-steam turbines for increasing power and improving fuel consumption of reciprocating-engined steamships.

**Air-Cooled Furnace Walls.**—Furnace Economy Co., 407 South Dearborn Street, Chicago. A 35-page book-

### Completes Large Telescope Tube



**ARC** welding of the joints of this telescope tube, 25 ft. long and 6 ft. in diameter, facilitated construction and at the same time provided a rigid structure. This tube, which was electrically welded by means of the Lincoln arc process, will carry a 69-in. telescope mirror produced by the United States Bureau of Standards. The complete telescope will be installed in the Perkins Observatory at Ohio Wesleyan University and was built by the Warner & Swasey Co., Cleveland.

let, illustrated, dealing with design and installation of air-cooled furnace walls.

**Electric Fans.**—Century Electric Co., St. Louis. Bulletin No. 41 catalogs the various types of portable, ceiling and ventilating electric fans.

**Mechanical-Drive Turbines.**—General Electric Co., Schenectady, N. Y. A 16-page bulletin, describing and picturing various types of mechanical-drive turbines.

**Lead Presses.**—John Robertson Co., 123 Water Street, Brooklyn, N. Y. Illustrated leaflet shows presses for sheathing electric cable with lead.

**Steam Turbine-Generators.**—General Electric Co., Schenectady, N. Y. Illustrated bulletin, 12 pages, describing the general principles, operation, construction and governing of steam turbines for driving electric generators.

**End-Wood Wheels.**—Metzgar Co., Grand Rapids, Mich. Illustrated catalog, 23 pages, describing uses and advantages of end-wood truck wheels for heavy-duty hauling of material in manufacturing plants.

**Industrial Accessories.**—Westinghouse Traction Brake Co., Pittsburgh. Descriptive catalog T-2035 covers in 24 pages auxiliary devices for industrial air-compressor plants.

**Controller Equipment.**—Bristol Co., Waterbury, Conn. Catalog No. 4000, 12 pages, with price insert sheets, covering air-operated diaphragm motor valves.

**Insulating Firebrick.**—Babcock & Wilcox Co., 85 Liberty Street, New York. Bulletin No. 80 describing a new firebrick claimed not only to have unusual insulating qualities but also to possess refractory characteristics that compare favorably with any high-grade firebrick.

**Radial Drills.**—Western Machine Tool Works, Holland, Mich. Circular No. 70 featuring the Western low-hung drive radial drill equipped with twin disk clutches and electric arm clamp.

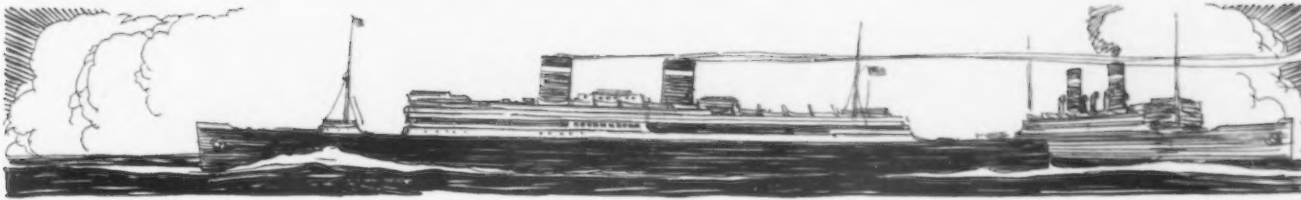
**Lathes.**—Western Machine Tool Works, Holland, Mich. Attractively illustrated catalog No. 100, 36 pages, containing descriptive data and specifications of Chard manufacturing and engine lathes equipped with Timken roller bearings.

**Ball Bearings.**—New Departure Mfg. Co., Bristol, Conn. Two-page bulletin showing applications of ball bearings to a deep-well pump motor and to an industrial clutch.

**Collapsing Taps.**—Geometric Tool Co., New Haven, Conn. Eight-page catalog covering universal and special collapsing taps, including taps with reamers, pilots and other combinations.

**Conveyors.**—Link-Belt Co., 910 South Michigan Avenue, Chicago. Book No. 1217 describes methods of handling fuller's earth used in filtering crude oil in the petroleum industry. Many illustrations of conveyor and elevator installations in this service are included.

**Automatic Screw Machines.**—Brown & Sharpe Mfg. Co., Providence, R. I. Folder emphasizing new speed ranges and ratios offered on three "30 spindle speed" machines for operation on brass, free cutting steel and other materials.



## MACHINERY EXPORTS AT LOWEST POINT IN SIX YEARS

WASHINGTON, July 2.—Making a sharp decline of \$4,456,851, exports of machinery from the United States in May dropped to \$26,620,583 from \$31,077,434 in April. The May total was the lowest for any month since February, 1925.

The heaviest decrease was reflected in agricultural implements and machinery, which sank to a level of \$2,490,000 from \$6,346,000. Outgoing shipments of oil-well machinery fell to \$648,000 from \$1,081,000, while industrial machinery showed a moderate gain to \$12,819,102 from \$12,426,231.

Other fair-sized increases included internal combustion engines, exclusive of automobile engines, rising to \$599,000 from \$343,000. Shipments of mining and quarrying machinery increased to \$896,000 from \$350,000 and machine tools to \$2,281,000 from \$1,805,000.

Compared with the corresponding month of last year, exports of machinery showed a decrease of \$23,190,484, or 46½ per cent. Exports in the first five months of the current year declined to \$168,818,075, compared with \$270,107,482 in the corresponding period of 1930, a drop of 39 per cent.

Imports of machinery, as listed in THE IRON AGE table, make a small gain in May to reach a value of \$1,176,562, against \$1,089,817 in April.

### Imports of Machinery into the United States

(By Value)

	May		Five Months Ended May	
	1931	1930	1931	1930
Metal-working machine tools.....	\$20,478	\$112,754	\$105,401	\$498,192
Agricultural machinery and implements.....	258,881	818,931	2,282,943	6,679,665
Electrical machinery and apparatus.....	235,728	278,652	1,020,385	877,750
Other power-generating machinery.....	37,035	62,909	133,517	236,551
Other industrial machinery.....	449,620	609,458	2,042,843	3,908,274
Vehicles, except agricultural.....	174,820	256,680	1,591,177	1,081,685
Total.....	\$1,176,562	\$2,139,384	\$7,176,266	\$13,282,117

### Machinery Exports from the United States

(By Value, in Thousands of Dollars)

	May		Five Months Ended May	
	1931	1930	1931	1930
Locomotives.....	\$35	\$108	\$104	\$398
Other steam engines.....	17	103	150	330
Boilers.....	44	125	169	610
Accessories and parts.....	14	76	216	304
Automobile engines.....	362	691	1,543	4,298
Other internal combustion engines.....	599	937	1,827	5,955
Accessories and parts.....	189	365	1,059	1,736
Electric locomotives.....	99	130	309	519
Other electric machinery and apparatus.....	384	852	2,079	4,518
Excavating machinery.....	265	710	1,465	4,838
Concrete mixers.....	55	122	367	522
Road-making machinery.....	201	512	662	2,140
Elevators and elevator machinery.....	259	475	1,413	2,708
Mining and quarrying machinery.....	896	1,292	5,055	7,834
Oil-well machinery.....	648	2,100	5,767	13,390
Pumps.....	421	1,027	1,618	4,558
Bending and power presses.....	333	421	1,703	2,200
Forging machinery.....	184	165	1,621	995
Machine tools.....	2,281	3,818	11,537	12,904
Other metal-working machinery and parts.....	277	631	1,617	3,178
Textile machinery.....	722	634	3,048	4,082
Sewing machines.....	343	767	18,847	3,657
Shoe machinery.....	95	187	475	806
Flour-mill and gristmill machinery.....	21	17	151	176
Sugar-mill machinery.....	47	333	386	936
Paper and pulp-mill machinery.....	124	253	637	1,236
Sawmill machinery.....	72	71	273	412
Other woodworking machinery.....	104	121	501	751
Refrigerating and ice-making machinery.....	119	202	766	1,646
Air compressors.....	197	613	919	3,020
Typewriters.....	867	1,486	4,768	8,831
Power laundry machinery.....	49	161	410	792
Typesetting machines.....	291	382	1,149	1,866
Printing presses.....	276	414	1,122	2,390
Agricultural machinery and implements.....	2,490	9,594	47,981	71,194
All other machinery and parts.....	13,239	19,916	47,104	94,377
Total.....	\$26,620	\$49,811	\$168,818	\$270,107

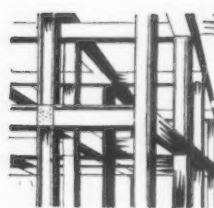
### Machinery Exports from United States

(Thousands of dollars)

	1931	1930	1929	1928
January.....	\$37,743	\$56,353	\$50,015	\$36,184
February.....	43,964	52,518	46,475	35,955
March.....	29,400	56,089	59,508	42,372
April.....	31,077	51,193	51,239	37,376
May.....	26,621	49,526	48,053	44,671
June.....	.....	42,648	49,732	43,098
July.....	.....	38,007	56,974	47,814
August.....	.....	34,294	50,179	44,303
September.....	.....	37,839	46,985	32,913
October.....	.....	30,974	53,188	45,080
November.....	.....	35,401	47,539	46,645
December.....	.....	36,231	49,584	45,090







# PLANT EXPANSION AND EQUIPMENT BUYING



## Machine Tool Buying At Low Ebb

## Summer Dullness Pervades Markets, Though Sentiment for Future Is Considerably Better

**M**ACHINE tool business, which has been steadily declining during the past few months, is at an extremely low ebb. Although a better sentiment with regard to the future pervades the industry, it is recognized that a number of favorable developments in the general business situation must occur before machine tool orders will be affected.

Considering the adverse seasonal

influences now at work, there are no expectations that an improvement in the volume of orders will come before late August or early September. A good many companies which have had equipment-buying programs in mind for some time have been taking renewed interest in them, but actual orders, in most instances, appear to be some distance off.

Prospects of purchases relate prin-

cipally to old projects, there being very little new inquiry.

The Board of Education of St. Louis opened bids this week on 50 items of shop equipment for the Herbert S. Hadley Vocational Training School. Engine lathes, turret lathes, shapers, milling machines, sensitive drilling machines, power hacksaws, grinding machines and other machines are included in the list.

### NEW YORK

Although the better sentiment of the past week or two has brought about more "conversations" concerning the purchase of machine tool equipment, actual orders are few. Some companies that have had equipment-buying programs in mind for some time are taking more interest in the eventual consummation of purchases, but it is apparent that most of them will await further favorable developments in the general situation before making definite commitments. The machine tool trade looks for little or no change in its volume of orders before late August or early September.

The Bureau of Supplies and Accounts, Navy Department, will open bids July 14 on a 13-in. x 50-in. toolmaker's precision lathe, a 13-in. x 36-in. toolmaker's precision lathe and a full universal turret lathe, all motor driven, for the Brooklyn Navy Yard. On the same date bids will be opened for motor-driven, single-cylinder surfacing machine for the ship Canopus. On July 21 bids will be opened for a high-speed motor-driven metal sawing machine for the Brooklyn yard.

### CHICAGO

Open inquiries are near the vanishing point and sales are very few. However, under the surface of the local machine tool market is a current of interest and a feeling that late summer will find shops busier. The elimination for the time being of the Milwaukee Road's list leaves the railroad field barren, and there is not an active industrial list in the district.

Even the plans of a manufacturer to go into production of radios and electric refrigerators have been set ahead to the fall months. The Chicago Board of Education will hold a meeting next week, at which time the list for the Austin High School may be considered.

### PITTSBURGH

The machinery market lacks life and local sellers will curtail activities considerably during the present month. Many salesmen will not be on the road and as a number of buyers are also on vacation little business is likely to be placed. Some talk is heard of rather heavy fall buying programs being planned by large interests, but inquiry at present is almost entirely lacking.

Makers of heavy machinery and equipment in this district are still busy and delivery on some recent orders has been delayed for several months. Crane business is light and little new inquiry is coming out.

### CLEVELAND

The machine tool market continues dull and the trade looks for no improvement during July and August. While a few manufacturing plants in metal lines are somewhat busier than a few weeks ago, others, particularly those that do automobile work, have curtailed operations. Orders are confined to single machines, and these are not plentiful. Railroads in this territory have purchased virtually no equipment this year, and there does not seem to be much prospect of business from this source for some time.

Not a great deal of used machinery is coming on the market. While a few companies have not been able to stand the long period of depression, these are small concerns and do not have much equipment to dispose of.

### NEW ENGLAND

Machine tool builders in this territory are, if anything, less active, although a few are busy on Russian orders. A. V. Alexandroff, an official Soviet representative, was in New England recently inspecting textile machinery. Orders for such equipment will not be closed until after Mr. Alexandroff returns to Russia, but it is estimated that several million dollars will eventually be placed and that at least some textile machinery makers will have to buy machine tools as a result.

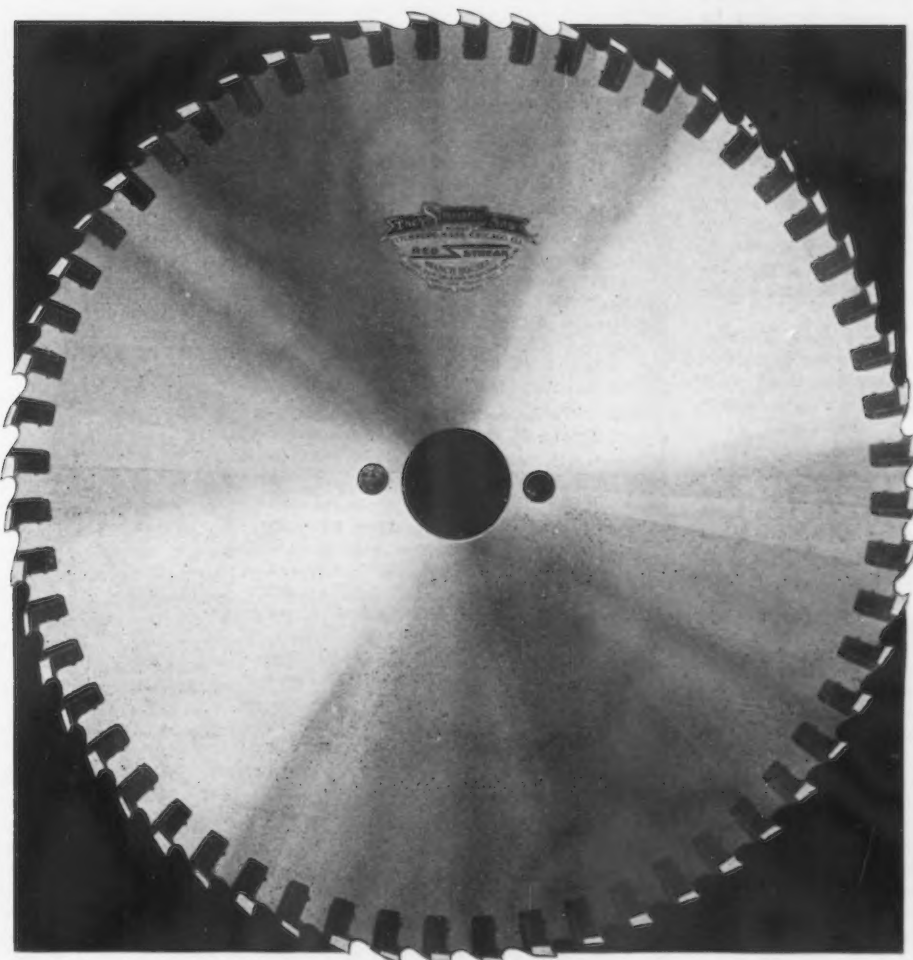
### CINCINNATI

Current machine tool orders are still few and call for only one or two machines at a time. A slightly more encouraging attitude toward purchasing is indicated in present inquiries, which look as though users are preparing to make purchases as soon as funds permit. A large percentage of inquiries, however, is for special machines or modified types of standard tools.

### MILWAUKEE

Already close to stagnation, the machine tool market suffered further reaction the past week from a recurrence of hot weather. Local demand fell off sharply, while production dropped precipitately. In addition, the

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incidence of a week-end holiday likewise kept business and output restricted. Inquiries from other industrial centers were limited. A public auction sale of some 300 metal-working tools and 75 wood-working machines to liquidate the entire stock of a local dealer, Badger-Packard Machinery Co., attracted a good attendance of prospective bidders, but sales were concluded at unusually low prices and considerable of the stock remains to be disposed of at private sale.

## New York

**P**LANs are under way by New Jersey Zinc Co., 160 Front Street, New York, for new plant for exclusive production of zinc sulphide at works at Palmetton, Pa., to cost over \$150,000 with equipment.

New York Steam Corp., 280 Madison Avenue, New York, is arranging expansion program, including installation of new feeder mains and lateral pipe lines, to cost over \$100,000.

Fassler Iron Works, Inc., New York, care of Louis Fassler, 1690 Vyse Avenue, Bronx, recently organized by Mr. Fassler and associates, plans operation of a local plant for production of iron and other metal products. Frank Fassler, 405 East Eighth Street, will be an official of company.

Port of New York Authority, 80-90 Eighth Avenue, New York, will receive bids until July 20 for electrical equipment for new bridge over Kill van Kull, between Port Richmond, S. I., and Bayonne, N. J.

Circle Flexible Conduit Co., 24 Woodward Avenue, Maspeth, L. I., has awarded general contract to H. Rosen, 242 Sumner Avenue, Brooklyn, for one-story addition, 95 x 100 ft., to cost about \$45,000 with equipment. Saul Goldsmith, 4914 Church Street, Brooklyn, is architect.

Sinclair Refining Co., 45 Nassau Street, New York, contemplates a new oil refinery near Longview, Tex., to cost more than \$250,000, including bulk oil storage and distributing facilities.

Navy Purchasing Office, New York, is asking bids until July 14 for machine tools, tank gages, hacksaw blades, metallic treads, fire extinguishing systems and other equipment.

V. LaBretta, Inc., Brooklyn, recently organized by Vincentina LaBretta, 334 First Street, and associates with capital of \$10,000, plans operation of local shop for production of tools and mechanical equipment. Philip E. Kopstein, 2239 Eighty-first Street, Brooklyn, is interested in company.

Stahl Meyer Co., Inc., 172 East 127th Street, New York, meat packer, has awarded general contract to W. E. Anderson, 885 Flatbush Avenue, Brooklyn, for a one-story addition to packing plant at Ridgewood, Brooklyn, 116 x 119 ft., to cost over \$60,000 with equipment.

Leib Deyo, room 791, 141 Worth Street, New York, purchasing agent for Commissioners of Palisades Interstate Park, New York and New Jersey, will receive bids until July 13 for a 50-hp. gasoline hoisting engine complete with three-drum power hoist, etc.

Department of Docks, Pier A, North River, New York, has begun work on

first three of group of five new piers between Forty-seventh and Fifty-first Streets, North River, each 1100 ft. long and 125 ft. wide, to include installation of elevating, conveying and other handling equipment for ocean steamships. A fund of \$9,500,000 has been authorized for project. Two additional piers will be built at early date.

Board of Public Works, Municipal Building, Hackensack, N. J., will proceed with superstructure for a new municipal automobile service, repair and garage building, to cost over \$60,000 with equipment. Frank Campbell is city engineer.

Kroydon Co., Burnet Avenue, Maplewood, N. J., manufacturer of golf clubs, irons, etc., has asked bids on general contract for one-story addition, to cost over \$35,000 with equipment. Daniel A. Hopper, 22 Ridgewood Avenue, Irvington, N. J., is architect.

Bergen County Board of Freeholders, Court House, Hackensack, N. J., has plans for a central power plant in connection with a new administration building at rear of Court House, entire project to cost over \$1,000,000. Edward L. Tilton and William F. Schwanewede, 420 Lexington Avenue, New York, are architects.

Fisher-Williams Corp., 110 East Forty-second Street, New York, has work under way on a five-story automobile service, repair and garage building at Jersey City, N. J., to cost over \$200,000.

Commanding Officer, Picatinny Arsenal, near Dover, N. J., will receive bids until July 13 for 60,000 springs, 75,000 primers and 65,000 time fuses; until July 14 for about 65,000 ft. brass, quantity of thumb nuts, wood screws, twist drills, nipples, tees, valves, steel stools, etc.; until July 15 for 17,000 metal containers for black powder.

Board of Education, Englewood, N. J., plans installation of manual training equipment in new two-story and basement junior and senior high school, to cost over \$800,000. Lawrence C. Light, 4 Dean Street, architect, will soon take bids on general contract.

## New England

**P**LANs are under way by Department of Mental Diseases, Commonwealth of Massachusetts, State House, Boston, for a steam power plant at Monson State Hospital, Palmer, Mass., to cost over \$300,000 with equipment. Edward C. Brown Co., 77 Summer Street, Boston, is engineer.

Board of Education, Pawtucket, R. I., will install machine shops, woodworking and other manual training shops in new Lyman B. Goff Junior High School, now in course of erection, to cost over \$400,000. Monahan & Meikle, Pawtucket, are architects.

Buzzards Bay Gas Co., Buzzards Bay, Mass., operating an artificial gas plant, has applied for permission to increase capital by \$100,000, majority of fund to be used for extensions and improvements.

Joseph Boorky, 60 Coral Street, Worcester, Mass., and associates have organized Massachusetts Steel Treating Corp., to operate a local steel-treating plant. Mr. Boorky will be president and treasurer.

Panther Rubber Mfg. Co., 31 Highland Street, Boston, manufacturer of rubber specialties, has plans for a new two-story plant at Stoughton, Mass., 50 x 160 ft., and 60 x 85 ft., to cost over \$65,000

with equipment. Schein & Levine, 333 Washington Street, Boston, are architects and engineers.

Boston Consolidated Gas Co., 100 Arlington Street, Boston, will issue additional capital stock totaling \$6,500,000, part of fund to be used for extensions and improvements in artificial gas plants and system.

Boston Elevated Railway, 31 St. James Avenue, Boston, has taken out a permit for extensions and improvements in power plant at 365 Commercial Street, to cost about \$65,000 with equipment.

Board of Education, Fairhaven, Mass., is considering installation of manual training equipment in two-story and basement addition to senior high school, for which general contract has been let to Locke-Thomas Co., 456 Acushnet Avenue, New Bedford, Mass., to cost about \$200,000.

City Council, Cambridge, Mass., has authorized fund of \$510,000 for extensions and improvements in municipal water system, including pumping and power equipment.

Standard Oil Co. of New York, 26 Broadway, New York, and 31 St. James Avenue, Boston, has plans for new bulk oil storage and distributing plant at Quincy, Mass., including automobile service and garage unit, to cost over \$450,000 with equipment. H. R. Morse, 31 St. James Avenue, is architect.

City of Boston has awarded contract for an intermediate school in Dorchester district, to cost \$850,000 with equipment. It will contain manual training shops. J. M. Gray Co., 175 High Street, Boston, is architect.

State of Massachusetts has plans by C. F. Springall, 50 Park Street, Malden, Mass., architect, for an air corps unit, with shops, at East Boston, to cost \$250,000 with equipment.

## Philadelphia

**B**IDS have been asked on general contract by Duoflex Piston Ring Co., 2000 South Seventy-first Street, for one-story addition, including improvements in present factory, to cost over \$35,000 with equipment. H. B. Tobias, 112 South Sixteenth Street, is architect.

United States Coast Guard Headquarters, Washington, has leased part of factory at Thirty-second and Arch Streets, Philadelphia, for a new repair base and radio supply plant for local Coast Guard.

Philadelphia Gas Works Co., 1401 Arch Street, Philadelphia, has plans for new pumping plant on Delaware River at Front Street, in connection with gas plant expansion and improvements at that place.

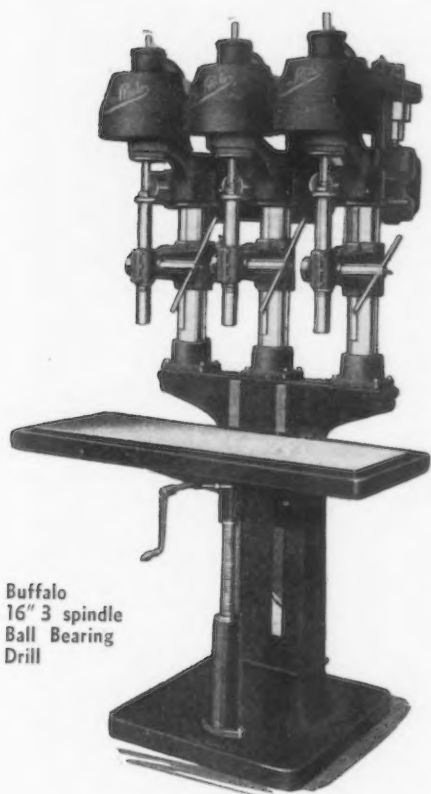
Sun Oil Co., 1608 Walnut Street, Philadelphia, is disposing of a note issue to total \$4,000,000, part of fund to be used for extensions and improvements in oil plants and properties. Company operates Sun Pipe Line Co. now building a pipe line through Pennsylvania to Ohio.

Harry D. Weidner, 504 Heine Street, Reading, Pa., and associates have organized Automatic Forming Die Corp., and plan operation of factory for production of die-forming machinery, parts, tools, etc. Clarence Mendelsohn, 424 South Twentieth Street, is interested in company.

Reading Co., Reading Terminal, Philadelphia, has awarded general contract to



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Franklin M. Harris Co., 1520 Parrish Street, for one-story car repair shop, to cost over \$45,000 with equipment. Clark Dillenback is company engineer.

Vibro Dental Products, Inc., 1530 North Broad Street, Philadelphia, manufacturer of dental equipment, supplies, etc., has leased space in building at 214-18 South Twelfth Street, for new manufacturing unit.

Diamond State Telephone Co., Wilmington, Del., has authorized appropriation of \$180,000 for expansion and improvements, including new cable lines.

Metal Specialties Co., Philadelphia, recently organized, has leased floor in building at Eleventh Street and Washington Avenue, for new plant.

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## Buffalo

BOARD of Education, Genesee, N. Y., contemplates installation of manual training equipment in new high school, to cost over \$250,000. R. Sherlock, 156 East Forty-sixth Street, New York, is architect.

Rochester Gas & Electric Corp., Rochester, N. Y., has disposed of a note issue totaling \$10,000,000, part of fund to be used for extensions and improvements.

Aluminum & Metal Products Corp., Buffalo, has been organized by George Rossing, 34 Granger Place, and associates, with capital of \$25,000 and plans operation of local factory for manufacture of metal goods. Leonard J. Simon, 308 Wellington Road, is interested in company.

Beebe Island Corp., an affiliation of Knowlton Brothers, Watertown, N. Y., operating a paper mill, and other local interests, has awarded a general contract to Fred T. Ley & Co., Springfield, Mass., for a hydroelectric power development on Beebe Island, to cost \$590,000 with transmission lines. It is proposed to have plant ready for service by close of year. Output will be used at various mills of affiliated interests and surplus power will be sold to Niagara-Hudson Power Co., Buffalo. Transmission line will be built for connection with high-tension system of Niagara-Hudson company.

C. F. Stanton Engineering Co., Inc., Syracuse, N. Y., recently organized by Joseph P. McNeill, 305 Seymour Street, and associates with capital of \$20,000, plans operation of local factory for manufacture of iron and other metal products. G. P. Van Nostrand, 707 Ackerman Avenue, is interested in company.

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## Cleveland

PLANS are being considered by Beach Enameling Co., Coshocton, Ohio, for a one-story addition, to cost over \$40,000 with equipment.

Owens-Illinois Glass Co., 965 Wall Street, Toledo, Ohio, has secured municipal approval of a zoning ordinance at Alameda, Cal., permitting erection of a new plant on site recently acquired and will proceed with plans for several buildings, including power house, machine shop and other units, to cost over \$1,000,000 with machinery. Company engineering department, Toledo, H. Barnard, chief engineer, will be in charge. California offices of company are at 133

Kearney Street, San Francisco, W. I. Cole is local manager.

Bennhoff Spring & Body Co., Cleveland, has been organized with capital of \$25,000 to manufacture steel springs, automobile bodies, etc. Company will take over and expand Bennhoff Spring Service, with plant at 2803 Lorain Avenue. New company is headed by G. A. and Howard Bennhoff.

City Council, Shaker Heights, Ohio, has awarded general contract to R. Hansen Construction Co., 9323 Sandusky Street, Cleveland, for a one-story municipal equipment service and distributing plant at Miles Heights, to cost about \$50,000. Schneider & Hirschfeld, 1836 Euclid Avenue, Cleveland, are architects.

Youngstown Pressed Steel Co., Warren, Ohio, a subsidiary of Sharon Steel Hoop Co., Sharon, Pa., is developing a new department for production of pressed steel enameled tiles. Space formerly used for metal lath division, which was acquired several months ago by United States Gypsum Co., Chicago, will be given over to new line, with installation of electric furnaces, enameling equipment, conveying machinery and other equipment.

S. A. Weller Co., Zanesville, Ohio, pottery manufacturer, has awarded contract to Austin Co., Cleveland, for a one-story steel frame addition, 148 x 240 ft., with monitor type roof.

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## Pittsburgh

CONTRACT has been let by Kendall Refining Co., Bradford, Pa., to Arthur G. McKee & Co., 2422 Euclid Avenue, Cleveland, engineers and contractors, for an addition to oil refinery, to cost \$350,000 with machinery.

Board of Public Education, Administration Building, Pittsburgh, is asking bids until July 15 for steel lockers for Fifth Avenue high school; steel shelving for various schools; grate bars, insulated wire and other supplies. H. W. Cramblet is secretary.

Diamond Glass Ware Co., Indiana, Pa., manufacturer of pressed and blown glass products, is planning to rebuild part of plant recently destroyed by fire, with loss of \$100,000 including equipment.

Kinite Corp., Tenth Street, Pittsburgh, manufacturer of alloy steel castings, with headquarters at Milwaukee, has taken over property at Fairmont, W. Va., for new branch foundry for production of molds for glass bottles and kindred castings.

Clinton Stark, 3848 State Street, Erie, Pa., and associates have organized Northwest Electric Construction Co., with capital of \$25,000, and plan operation of local works for manufacture of electrical machinery, including parts and assembling. John R. O'Brien, 160 East Thirty-fourth Street, is interested in company.

Freedom Oil Works Co., Freedom, Pa., is planning to rebuild part of lubricating oil division recently destroyed by fire, with loss over \$200,000 including machinery.

Fort Pitt Flask Equipment Co. has been organized by C. H. Curry, Coraopolis, Pa.; H. J. Koch, Pittsburgh, and C. S. Koch, Edgewood, Pa., with a capitalization of \$250,000, to manufacture foundry flasks.

## St. Louis

CITY Council, Fredonia, Kan., has plans for extensions and improvements in municipal electric light and power plant, including one-story addition, 47 x 50 ft., to cost over \$40,000 with equipment. Black & Veatch, Mutual Building, Kansas City, Mo., are engineers.

Motors and other power equipment, conveying and other machinery will be installed in new five-story basement and sub-basement newspaper printing and publishing plant to be erected by Star Chronicle Publishing Co., St. Louis, to cost over \$500,000 with equipment. Bids will be asked on general contract this month. Frank D. Chase, Inc., 720 Michigan Avenue, Chicago, is architect and engineer.

James R. Kearney Corp., 4232 Clayton Street, St. Louis, manufacturer of electrical equipment, has work under way on an addition to cost about \$125,000 with machinery, and expects to have unit ready for occupancy soon.

Joplin Stockyards Co., Inc., West Fifth Street, Joplin, Mo., has work under way on expansion and improvements to include construction of new buildings with two trailer unloading docks and other unloading and conveying equipment. Entire project will cost about \$100,000.

American Airways, Inc., Lambert Field, Robertson, near St. Louis, has plans for a one-story hangar, 160 x 200 ft., with lean-to extension for repairs and other service, at airport at Chicago, to cost about \$100,000 with equipment. Hoener, Baum & Froese, 3605 Laclede Avenue, St. Louis, are architects.

Western States Grocery Co., 823 East Second Street, Little Rock, Ark., will soon take bids for a two-story storage and distributing plant, with elevating, conveying and other handling equipment, to cost about \$60,000. Eugene J. Stern, A.O.U.W. Building, is architect.

State Board of Affairs, State Capitol Building, Oklahoma City, Okla., W. C. Hughes, chairman, has plans for a new one-story industrial building at Oklahoma State School for Deaf, Sulphur, to cost about \$90,000 with equipment. Layton, Hicks & Forsyth, Braniff Building, Oklahoma City, are architects.

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## South Atlantic

PLANS are being considered by Potomac Electric Power Co., Washington, for a new steam-operated electric generating plant in District of Columbia or vicinity, to cost over \$2,500,000 with transmission lines. New unit will be provided with complete automatic coal-handling and burning equipment.

Quartermaster Department, Edgewood Arsenal, Md., will receive bids until July 24 for fuel oil-burning equipment, including burner parts with castings, spare burners, pumps, oil meters, heaters and auxiliaries, automatic control system with electrical connections, including control board, switches for boilers, starter boxes, etc.

Chief of Engineers, Washington, is asking bids until Aug. 4 for construction of a 24-in. pipe line dredge for service in St. Louis district, comprising all-steel hull, steam-driven with watertube boilers, engines and auxiliary power equip-



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ment. Boat will be 196 ft. long, 44 ft. wide and 7.6 ft. deep.

Chamber of Commerce, Durham, N. C., Frank A. Pierson, secretary, is at head of project to build and operate a municipal airport and will have plans prepared for hangar, with repair facilities, and other field units. Site of 5000 acres has been offered by Duke University.

Chemical Warfare Service, Edgewood Arsenal, Md., is asking bids until July 14 for one box-type electric furnace and for one electric air draw oven.

Pennsylvania Railroad Co., Broad Street Station, Philadelphia, has awarded contract to Arundel Corp., Pier 2, Pratt Street, Baltimore, for underground conduits, poles for overhead transmission and other work in connection with electrification of lines between Baltimore and Washington, at price of about \$2,000,000.

Catawba Boat Co., Hickory, N. C., care of E. A. Ivey, Hickory, recently organized by Mr. Ivey and associates with capital of \$500,000, plans operation of local boat-building and repair plant. L. S. Ivey, Hickory, will be an official of company.

Constructing Quartermaster, Fort Monroe, Va., will receive bids until July 28 for a radio building at Langley Field, Va.

City Council, Norfolk, Va., is planning to rebuild municipal wharves, warehouses and other buildings recently destroyed by fire, with installation of conveying, elevating and other mechanical-handling equipment.

City Council, Brunswick, Md., plans extensions in municipal waterworks to cost about \$100,000, including seven-mile pipe line from city to Rohrsersville, where property was recently acquired for additional water source.

General Purchasing Officer, Panama Canal, Washington, is asking bids until July 13 for insulated wire, wood screws, copper tacks, galvanized cut tacks, rolling-door chain, etc.; until July 23 for pipe, steel springs, metal roofing, electric drills, safety lamps, knife switches, extension ladders, nails and other mechanical equipment.

## Indiana

FORMER plant of Chard Lathe Co., Newcastle, has been taken over by Empire Tool Co., Dayton, Ohio, manufacturer of dies, tools, jigs and special machinery, for new plant. Present works will be removed from Dayton and capacity increased.

Indiana State Highway Commission, State House Annex, Indianapolis, J. J. Brown, director, is asking bids until July 14 for new automobile service, repair and garage building for State motor trucks and cars, to cost close to \$140,000 with equipment. Vonnegut, Bohn & Mueller, Indiana Trust Building, are architects and engineers.

Lone Eagle Mfg. Co., Inc., Shelburn, recently organized by Frank L. Dains, Shelburn, and associates with capital of \$100,000, plans operation of local factory for manufacture of automotive equipment, barrel racks and kindred specialties. L. W. Patton, Shelburn, is interested in company.

Municipal Power Plant Committee, City Council, Richmond, is considering new call for bids for equipment and work in connection with expansion and improvements at municipal electric light

and power plant to cost \$850,000. R. Husselman, Union Trust Building, Cleveland, is consulting engineer.

## Detroit

PLANS are under way by Ethyl Gasoline Corp., 135 East Forty-second Street, New York, for extensions in gasoline testing and engineering plant at Detroit, to cost about \$50,000 with equipment.

Harvey Paper Products Co., Sturgis, Mich., manufacturer of paper cups and kindred products, has plans for an addition, to cost over \$40,000 with equipment.

Wisconsin-Michigan Power Co., Iron River, Mich., has arranged for a bond issue of \$5,000,000, part of proceeds to be used for expansion and improvements in power plants and system. Executive offices are at Appleton, Wis.

General Parts Corp., Flint, Mich., manufacturer of automobile parts, has purchased service departments of Peerless Motor Car Corp. and Jordan Motor Car Co., both at Cleveland, and in future will manufacture and distribute all replacement parts for former models of both cars. It is understood that production will be concentrated largely at main plant at Flint.

McDonald Tool & Engineering Co., Detroit, has been organized with capital of \$25,000 to take over and expand company of same name with plant at 1537 Temple Street, specializing in production of tools, jigs, dies, fixtures, etc. New company will be headed by W. J. McDonald, Jr., and Emil J. Heinrich.

Vertique Marble Co., Ishpeming, Mich., will dispose of preferred stock in amount of \$100,000 and block of 40,000 shares of common stock, no par value, a considerable portion of proceeds to be used for establishment of new marble quarry near city, including quarrying and mining machinery, hoisting, conveying and kindred equipment.

Board of Education, Muskegon, Mich., has plans for a steam power plant at Hackley school and public library, to cost close to \$30,000 with equipment.

Board of Trustees, Michigan Technical School, Houghton, Mich., has plans for a new chemistry and laboratory addition, to include grinding machinery and other equipment, to cost about \$90,000. Erection will begin late in summer.

Ford Motor Co., Dearborn, Mich., has received an order from Post Office Department, Washington, for 1500 motor truck chassis, 500 of  $\frac{3}{4}$ -ton carrying capacity, and 1000 of  $1\frac{1}{2}$  tons rating. This is largest purchase of motor equipment made by a Government department since World War.

## Chicago

CONTRACT has been let by W. M. Welch Mfg. Co., 1515 Sedgwick Street, Chicago, manufacturer of scientific instruments and parts, to Morton Brothers, 1835 Winona Street, for a four-story addition, 25 x 100 ft., to cost over \$50,000 with equipment. Part of unit will be used for storage and distribution. Granger & Bollenbacher, 333 North Michigan Avenue, are architects.

Dial Mfg. Co., 1280 East Logan Street, Decatur, Ill., recently organized with capital of \$50,000, plans operation of local factory for production of metal specialties. Joseph P. and Arthur J. Dial are heads.

Board of Education, City Hall, Minneapolis, Minn., contemplates early call for bids on general contract for first unit of a new vocational school, three stories and basement, to cost \$400,000 with equipment. Bureau of Buildings, 811 N. E. Broadway, is architect and engineer. George F. Womrath is business superintendent.

Dubuque Packing Co., Dubuque, Iowa, recently acquired by new interests headed by Harry W. Wahlert, is planning expansion and improvements at meat-packing plant, including installation of refrigerating, conveying and other equipment, to cost \$100,000. Mr. Wahlert is president of reorganized company.

Board of Trustees, John Fletcher College, Oskaloosa, Iowa, is considering erection of new light and power plant to cost about \$35,000 with equipment. W. P. Carr is secretary in charge.

Common Council, Lake Mills, Iowa, is considering a bond issue of \$90,000, fund to be used for installation of a municipal electric light and power plant. J. D. Kent is town clerk.

Board of Education, Rock Springs, Wyo., contemplates installation of manual training equipment in new multi-story grade and high school for School District No. 4, Sweetwater County, to cost over \$350,000 with equipment. General contract has been let to Kellogg Lumber Co., Rock Springs. Mountjoy & Frewen, Patterson Building, Denver, are architects.

Central Illinois Public Service Co., Springfield, Ill., has arranged for bond issue of \$3,200,000, part of proceeds to be used for extensions and improvements, including transmission lines.

Bradley Tractor Co., 919 North Michigan Avenue, Chicago, has arranged for an increase in capital from 10,000 to 20,000 shares of stock, no par value, for expansion.

## Gulf States

WORK is under way by Southern Pacific Co., Dallas, Tex., on extensions and improvements in engine house and shops at Ennis, Tex., to cost about \$95,000 with equipment. Capacity of plant will be increased to handle larger locomotives.

Service Foundry, Inc., New Orleans, has awarded general contract to T. A. Pittman, Inc., Canal Bank Building, for a one-story foundry, to cost about \$20,000 with equipment.

Danciger Oil & Refining Co., Pampa, Tex., operating a local refinery under name of Petroleum Refractionating Corp., has plans for a new oil refinery near Longview, Tex., to cost over \$200,000 with machinery. New unit will be operated under direction of Bell Oil & Gas Co., Tulsa, Okla. Project will include pipe line extensions from east Texas oilfield and large storage and distributing plant.

Birmingham Gas Co., Birmingham, operating artificial gas properties, has arranged for a note issue to total \$1,250,000, part of fund to be used for extensions and improvements.

Solid Carbonic Corp., Houston, Tex., C. W. Parsons, head, is considering

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erection of a dry ice-manufacturing plant near San Benito, Tex., to cost over \$200,000 with machinery.

Walter Campbell and H. L. Lockhart, associated, Gladewater, Tex., have secured a site on Johnson farm in city and plan erection of a new oil refinery for production of gasoline, kerosene and other oils. Initial unit will cost over \$60,000 with machinery. It is proposed to organize a company to carry out enterprise.

Florida Lime Co., Eighth and Lake Weir Avenues, Ocala, Fla., has plans for rebuilding part of hydrated lime-manufacturing plant recently destroyed by fire. New one-story unit, 75 x 100 ft., will be erected; equipment to be installed includes crushing machinery, hammer mill, hydrators, air separators, dust collector, etc.

Wofford Oil Co., Mobile, Ala., has acquired five-acre tract at Reese Ferry on Alabama River, near Montgomery, as site for new oil storage and distributing plant, to cost about \$90,000 with equipment.

Turner Terminal Co., Mobile, has awarded general contract to D. E. Jett Construction Co., Mobile, for extensions and improvements in oil and boat terminals on waterfront, to cost about \$50,000.

Construction Quartermaster, Maxwell Field, Montgomery, Ala., will receive bids until July 17 for furnishing and erecting a steel tank of 300,000-gal. capacity on 100-ft. steel trestle.

Southern Animal Trap Co., Inc., New Orleans, care of F. J. Fortler, 138 South White Street, vice-president and general manager, is securing local property under lease for establishment of new plant for production of steel animal traps and trapping devices, with initial output of close to 35,000 trap units a day.

## Cincinnati

BOARD of Education, Dayton, Ohio, C. J. Schmidt, clerk, Ludlow Building, is planning installation of manual training equipment in new two-story and basement junior high school to cost \$300,000, for which bids are being asked on general contract until July 14. Herman & Brown, Reibold Building, are architects.

Dayton Rubber Co., 2345 West River-view Avenue, Dayton, Ohio, manufacturer of automobile tires, etc., has awarded general contract to Danis-Hunt Co., 1530 East First Street, for a one-story addition, 100 x 160 ft., primarily for storage and distribution, to cost more than \$50,000 with equipment. Geyer & Neuffer, Ludlow Arcade Building, are architects.

Contracting Officer, Wright Field, Dayton, Ohio, is asking bids until July 13 for 207,000 ft. tinned copper wire braid; until July 20 for 200,000 internal gaskets, 200,000 electrodes, 75,000 spark plugs, 990 propeller blades, 600 volt-ammeter assemblies, 34 installation parts

for low target windlass; until July 21 for 230 propeller hub assemblies.

Company is being organized under direction of John Wilkes, 64 Arcade Building, Nashville, Tenn., engineer, to install and operate a water system at White Bluffs, Tenn., where franchise has been secured. Installation will include an elevated steel tank of about 30,000 gal. capacity, electric-operated pumping machinery and other equipment.

United States Engineer Office, Louisville, is asking bids until July 15 for heating equipment for power house at Lock and Dam No. 48, Ohio River.

Citizens Advisory Committee, Middleboro, Ky., operating in conjunction with City Commission, is considering a petition for a bond issue of \$250,000 for a municipal electric light and power plant.

Victor Chemical Works, 343 South Dearborn Street, Chicago, has purchased 2500 acre tract of phosphate rock and mineral lands in Maury County, Tenn., near Southport. Plans are being considered for development of portion of property, including a phosphate rock mining, storage and distributing plant. Company has also secured control of Mount Pleasant Southern Railway, operating in phosphate rock district.

## Milwaukee

POSTPONEMENT from July 6 to 11 has been declared in closing date of bids for erection of three units of new \$1,000,000 high school in village of Whitefish Bay, Milwaukee P. O., according to Herbert W. Tullgren, architect, 1234 North Prospect Avenue, Milwaukee. Bids will be opened July 13.

Village Board, Gresham, Wis., is taking bids until July 20 for erection and equipment of new municipal hydroelectric generating plant with 650-ft. penstock. Equipment includes one 125-kva. 2300-volt waterwheel-driven generator and one 219-kva. unit of similar design. Only one unit will be installed at this time. Project is in charge of Orbison & Orbison, consulting engineers, Appleton, Wis.

Nelson & Paulsen, Lathrop Road, Racine, Wis., manufacturers of sheet metal products, have placed contracts for one-story shop addition, 38 x 87 ft.

G. E. McNamee Co., 1197 East North Avenue, Milwaukee, dealer in scrap metals, has changed its name to Monteith Iron & Steel Co. Gordon E. McNamee is retiring from company, which will be continued under direction of Robert Monteith, Jr.

Jenkins Machine Co., Sheboygan Falls, Wis., has filed voluntary petition in bankruptcy, scheduling liabilities at \$296,675 and assets at \$237,007. Company is one of oldest and largest manufacturers of wood-working and special machinery in Central West and originally was established in Sheboygan, Wis., later moving to Sheboygan Falls upon its consolidation with Falls Machine Co.

## Pacific Coast

BIDS have been asked on general contract by San Jose Cement Co., Ltd., 835 Howard Street, San Francisco, for new mill on site recently acquired about eight miles from San Jose, Cal., including power house, machine shop, pumping plant and other units, to cost close to \$2,000,000 with machinery. Hunt, Mirk & Co., 141 Second Street, San Francisco, are engineers.

Olinda High School District, Brea, Cal., will soon take bids on general contract for a one-story and basement vocational training school, 56 x 106 ft., to cost about \$35,000 with equipment. T. C. Kistner & Co., Architects Building, Los Angeles, are architects.

Cudahy Packing Co., 803 Macy Street, Los Angeles, meat packer, headquarters at Chicago, has awarded general contract to W. H. Baum Co., 108 West Sixth Street, for two-story addition to packing plant, to cost about \$45,000 with equipment.

James P. and D. J. Murnane, 737 North Olive Street, Burbank, Cal., have organized Murnane Safety Store Front Co., with capital of \$45,000, and plan operation of plant in Pittsburgh, Pa., district for manufacture of metal store fronts. Ashley E. Dreyer, 7115 Card Lane, Pittsburgh, is interested in company.

Santa Rosa High School District, Santa Rosa, Cal., has taken bids on general contract for a one-story vocational shop, 64 x 110 ft., for auto mechanics department and repair shop, to cost about \$25,000 with equipment. William Herbert, Rosenberg Building, is architect.

State Highway Department, Olympia, Wash., has plans for a one-story automobile and motor truck service and repair plant at Seattle, 65 x 137 ft., with one-story office adjoining, 53 x 71 ft., to cost about \$60,000 with equipment.

A. R. Maas Chemical Co., 308 East Eighth Street, Los Angeles, manufacturer of industrial chemicals, has asked bids on general contract for a one and two-story plant, 55 x 137 ft., to cost over \$60,000 with equipment. H. Roy Kelley, Architects Building, is architect.

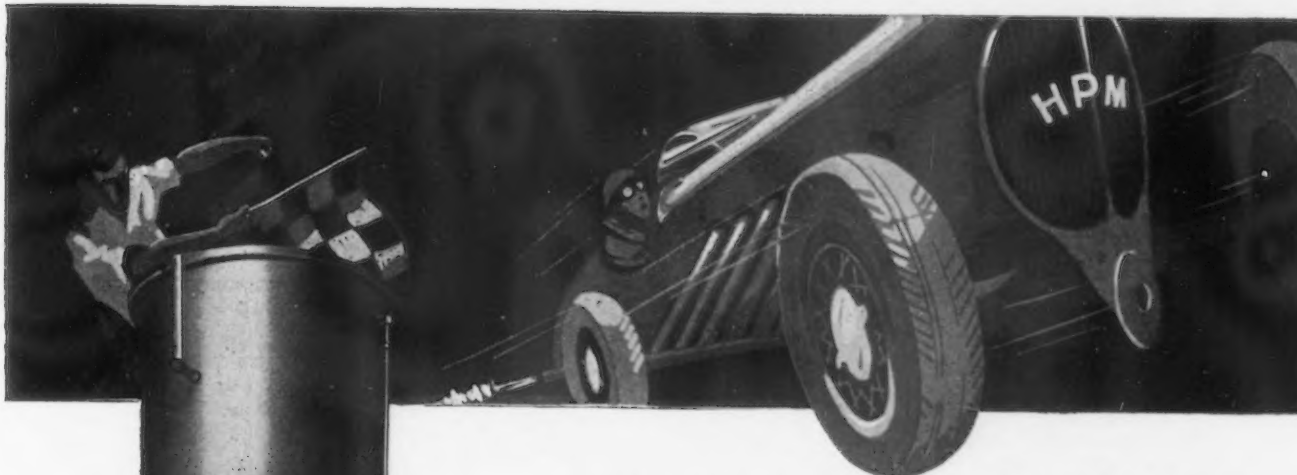
Fugit Smokeless Orchard Heater Co., Ltd., Alhambra, Cal., care of B. Dean Clanton, 709 Haas Building, Los Angeles, attorney, recently organized, plans operation of plant near Alhambra for production of heaters and heating devices for fruit orchards. Company is headed by Carl A. Fugit, Alhambra, and Orville R. Clanton, San Marino, Cal.

Wire Rope & Equipment Co., First Street South and Jackson Avenue, Seattle, is planning to rebuild part of plant recently destroyed by fire, with loss over \$150,000 including equipment.

Bureau of Yards and Docks, Navy Department, Washington, has awarded general contract to Thomas Haverly Co., 316 East Eighth Street, Los Angeles, for erection of major portion of new naval ammunition works, Island of Oahu, Hawaii, at price of \$2,030,445, including







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# CONTROL

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## ▲ ▲ Business as Others See It Digest of Current Financial and Economic Opinion ▲ ▲

**A** NEW economic line-up is envisioned as a result of Mr. Hoover's moratorium scheme and a few other things contributing toward better world conditions. These others include the new stand of the United States railroads in demanding a fair chance to earn a profit. And the President's challenge to radicalism, made in his Indianapolis speech, forestalling action on the dole, public ownership, tariff whittling, etc., is cited by Brookmire as worthy of greater attention than it has received.

An overwhelming burden of indebtedness is giving rise to many demands for relief. *Financial Chronicle* quotes Senator King's estimate that a load of \$300,000,000,000 "rests on the United States." This includes Federal, State, county, municipal, township and other public issues, railroad and public utility bonds, industrial borrowings, realty mortgages and banking, commercial and personal indebtedness.

Brookmire refers to this as the basis for demand for subsidies of various kinds, particularly as "an expression of the discontent of the farmers as a debtor class. As in the 1870's and the 1890's, and in all periods of falling prices, we shall see this ferment at work in the 1930's."

*Annalist*, also, uses the European crisis to point to "the importance of intangibles," but says that the better commodity prices are "already being shaped by material

factors, and by what may be called the normal sentiment factors, as distinguished from . . . the debt postponement plan. . . . The impending change of the highest consequence is a new relation of the United States to the economic and political affairs of Europe, which would seem to be wholly unavoidable now."

### Turn Already Seen by Some

Already the effect of sentiment on business has been shown to be great. *Commerce and Finance* comments on this and says: "We believe the turn has come. . . . We feel confident that a long period of prosperity is ahead of us." Harvard Economic Society, too, thinks that "the great depression has about run its course," but that recovery may be "slow and somewhat uncertain."

"From present appearances," says *Financial Chronicle*, "there is not even a remote chance of the country's getting back to that state of extreme depression which existed when Mr. Hoover entered upon his task. . . . We may be sure that the advantage already gained in starting business will not be lost. Business men now talk differently and act differently . . . and this is sure to be reflected in growing trade revival, even though the progress at first be slow."

Referring to the demand made at the convention of advertising men for "a more equitable division

of profits," *Financial Chronicle* remarks: "If unionized labor, at war wages, is not getting a lion's share of present profits, who is getting it? . . . Wages cannot forever be blind to the rights and interests of capital. If out of our present debacle in economics we are to reap only a few more socialistic doctrines, we are not soon to recover our wonted prosperity. What we need is rest from agitation, not a new revolution!"

### Industrial Wages Absorbed

National City Bank of New York says something about wages in the steel industry, quoting from reports of the United States Steel Corporation and the price composites of THE IRON AGE. Comparing 1930 with 1902 and 1903, yearly average wages have been increased 157 per cent, finished steel has advanced 18¼ per cent and pig iron has declined 5½ per cent." It should be added that the number of hours constituting a day's work and a week's work were substantially reduced," says the bank.

However, "by new methods the industries have been able to absorb a large part of the rise of prices which otherwise would result to the public from the rise in wages. If there is a single exception to this rule among the more important industries, we have failed to find it."

Expanding business, says Alexander Hamilton Institute, "will not suffer from a lack of credit."

13 buildings, 12 miles of railroad, water, sewage, drainage and electrical systems. Project will include a waterfront shipping plant at West Loch, Pearl Harbor, with mechanical handling facilities, and storage and distributing station at Lualuale. Bureau has also made award to W. T. Thurston Co., Inc., Richmond, Va., for a submarine escape training tank at Pearl Harbor, T. H., at price of \$61,900.

## Canada

**P**ERMISSION has been asked by Shawinigan Water & Power Co., Ltd., Montreal, to construct a hydroelectric power development plant on Upper St. Francis River between Allard Bay and Lake Aylmer in Quebec.

Lazare Tremblay, St. Cyprien, Que., will rebuild wood-working factory recently destroyed by fire and will purchase new equipment.

C. M. Corkett, clerk, Brampton, Ont.,

is receiving bids for mechanical equipment for two clarifiers and one digester tank, sludge pump and motor, air compressors, motors, etc.

Bonna Pipe Co., Paris, France, and Montreal, is contemplating establishment of a pipe manufacturing plant in North Vancouver, B. C., according to Col. F. J. O'Leary, consulting engineer. Company manufactures steel core and reinforced concrete pipe.

## Foreign

**E**XPANSION is planned by Kildun Mining Corp., Nathula, Mexico, including addition to power plant and installation of new mining machinery and operating equipment. Company is arranging sale of stock, proceeds to be used for work. Headquarters are at 135 Broadway, New York. J. H. A. Williams is president.

Japan Petroleum Co., Tokyo, Japan, has plans for an addition to its gasoline refinery in Kinsui oilfields, Taiwan, to cost over \$350,000 with machinery. Present

works have capacity of 25,000 gal. daily, and new unit will increase this by 15,000 gal., using 30,000,000 cu. ft. gas a day.

South American Gulf Oil Co., 21 State Street, New York, a subsidiary of Gulf Oil Corp., Frick Annex, Pittsburgh, will develop and operate oil properties in Colombia, where 50-year concession has been secured from Government. According to agreement, company will select and drill areas in Barco district; when daily output of 3000 metric tons (21,000 bbl.) is developed, company is required to build a pipe line within Colombian territory to a point on Atlantic Coast; when output reaches 4000 metric tons (28,000 bbl.) company is obligated to erect an oil refinery on Colombian site.

Cuban International Sugar Corp., Havana, Cuba, is reported to have concluded negotiations with Nationalist Government Ministry of Industries, Shanghai, China, for erection of a new sugar refinery near last-noted city, to have a capacity of 1000 tons a day. Agreement provides for fund of \$5,000,000 for project, to be provided equally by Cuban company and Nationalist Government.

